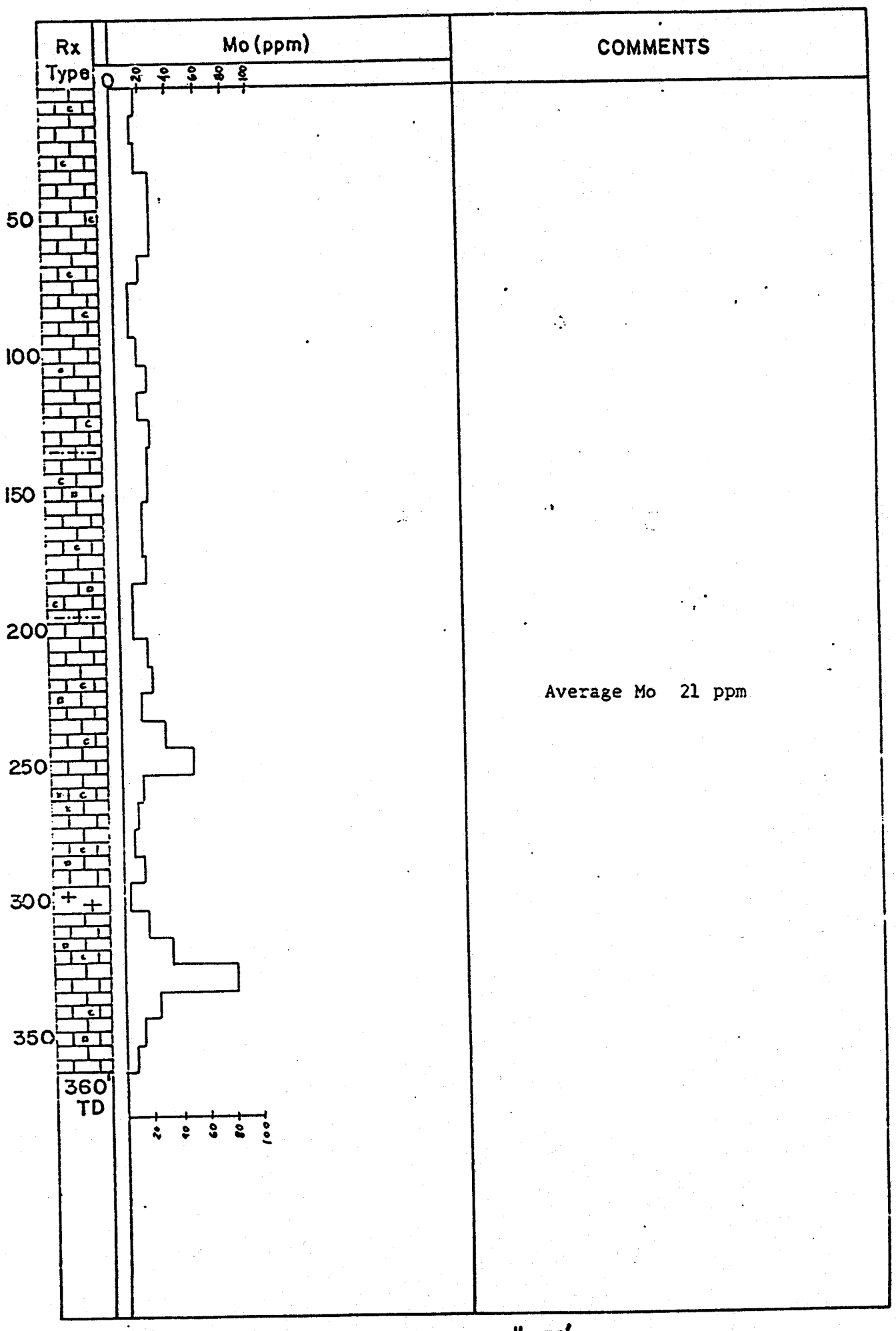
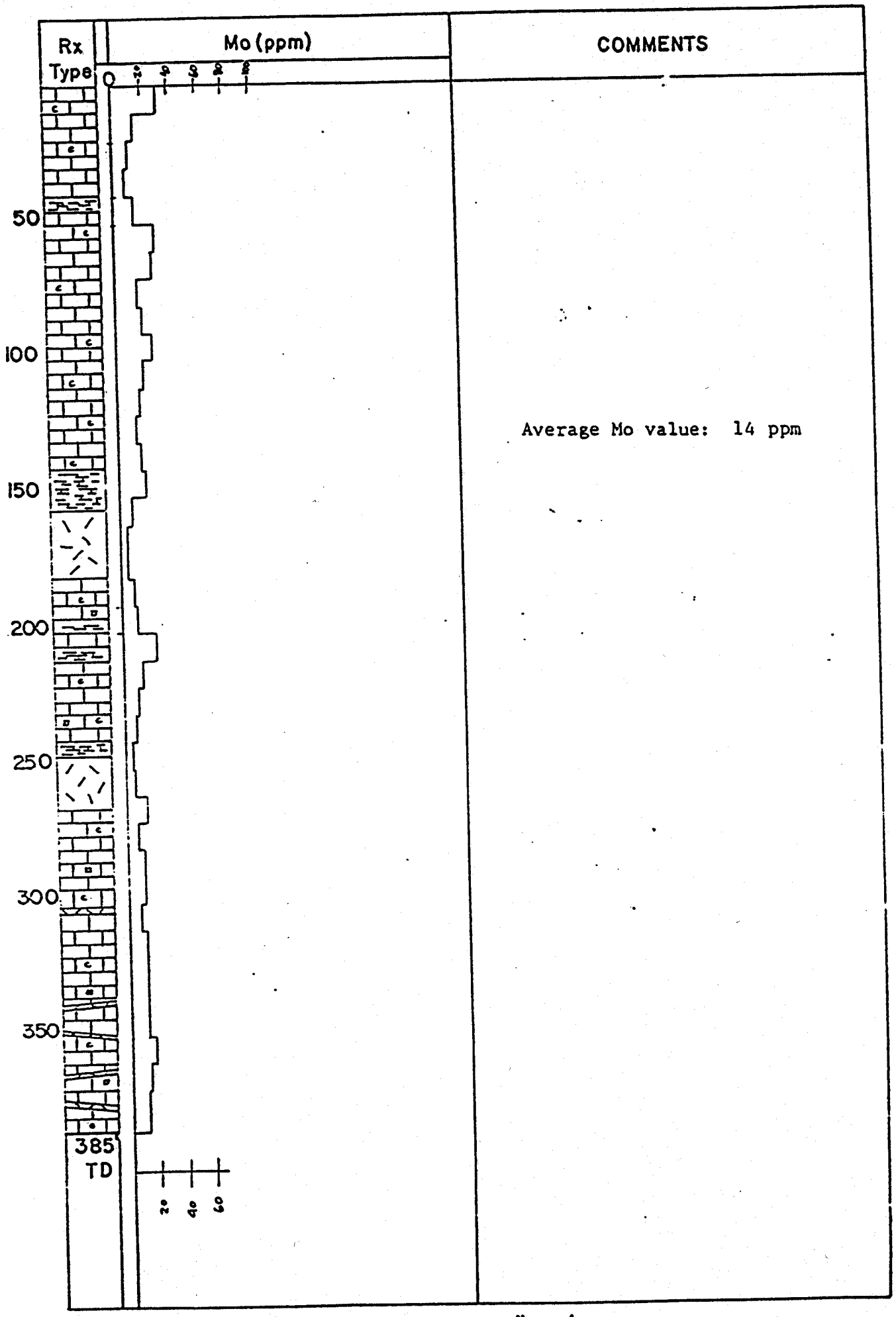
3300 0031

ROTARY HOLE LP-1



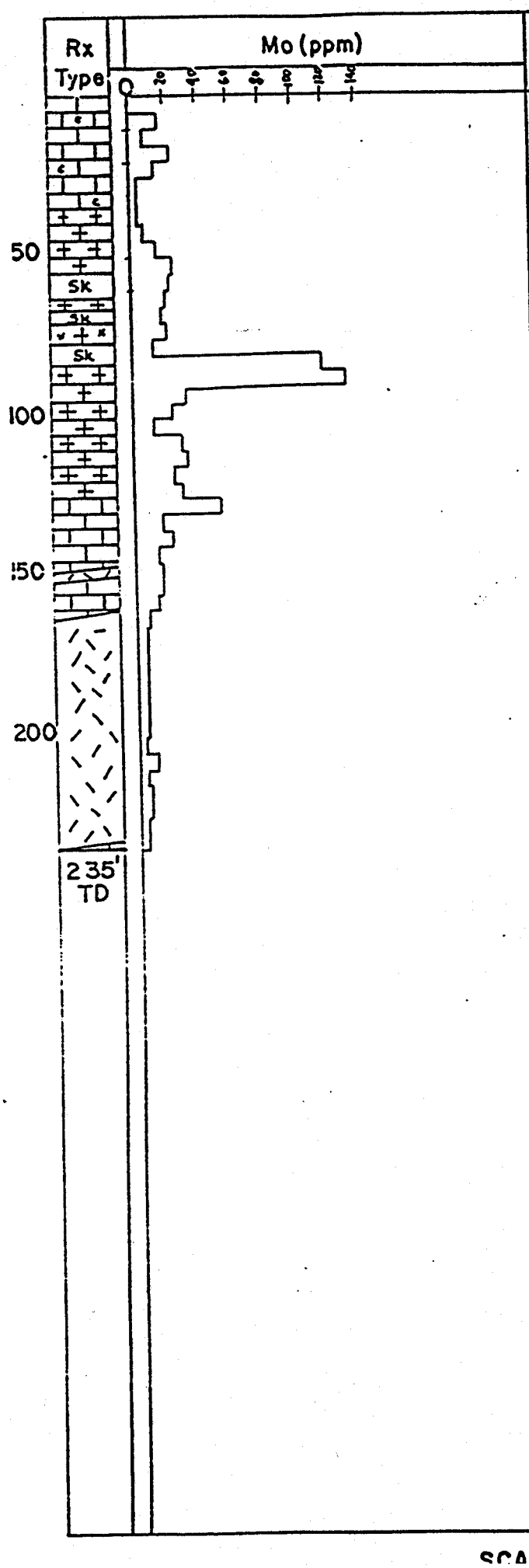
SCALE 1" = 50'

ROTARY HOLE LP-2



SCALE 1" = 50'

ROTARY HOLE LP-3



COMMENTS

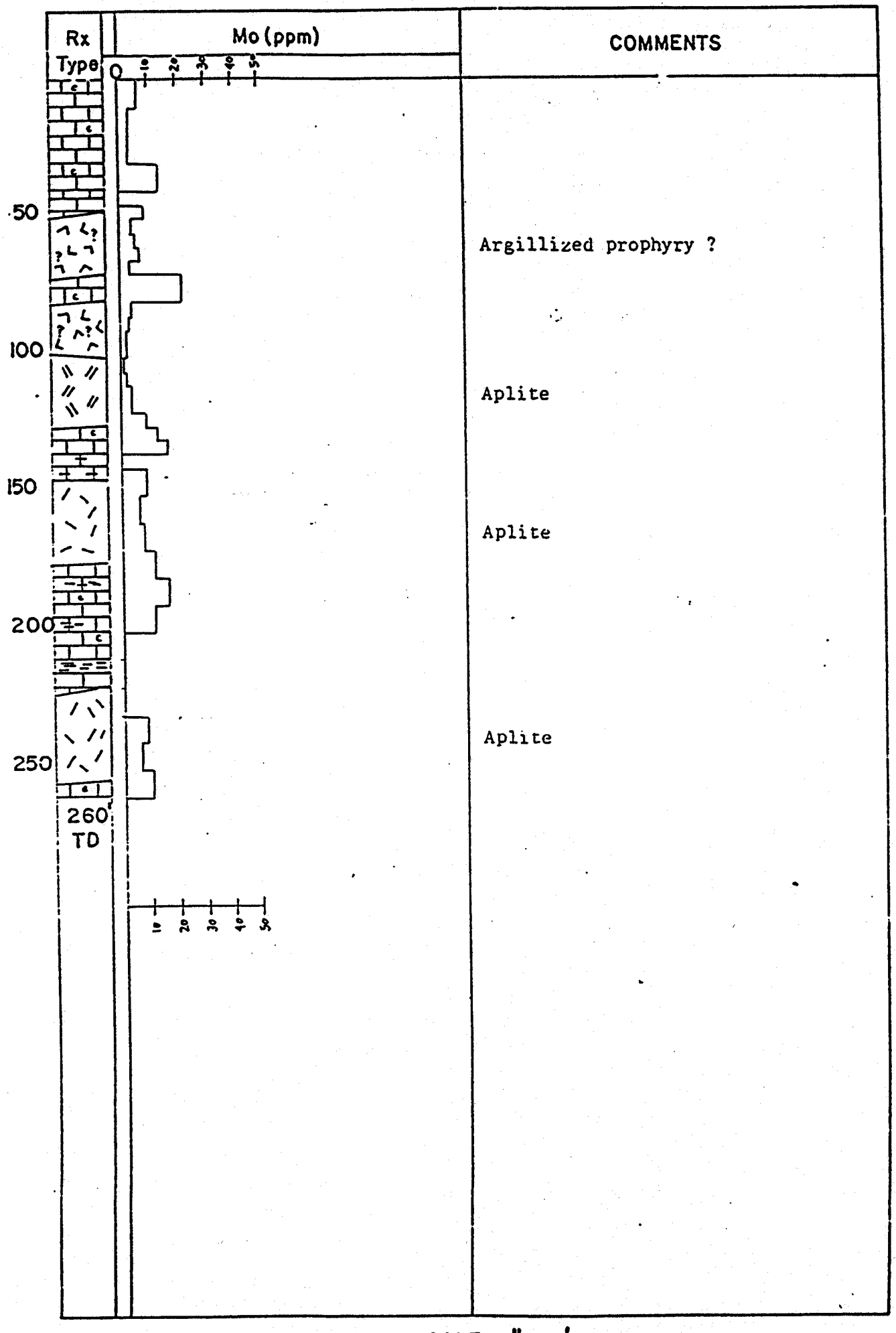
Average Mo in skarn: 44 ppm.

Light gray aplite.

Average Mo in intrusive: 7 ppm.

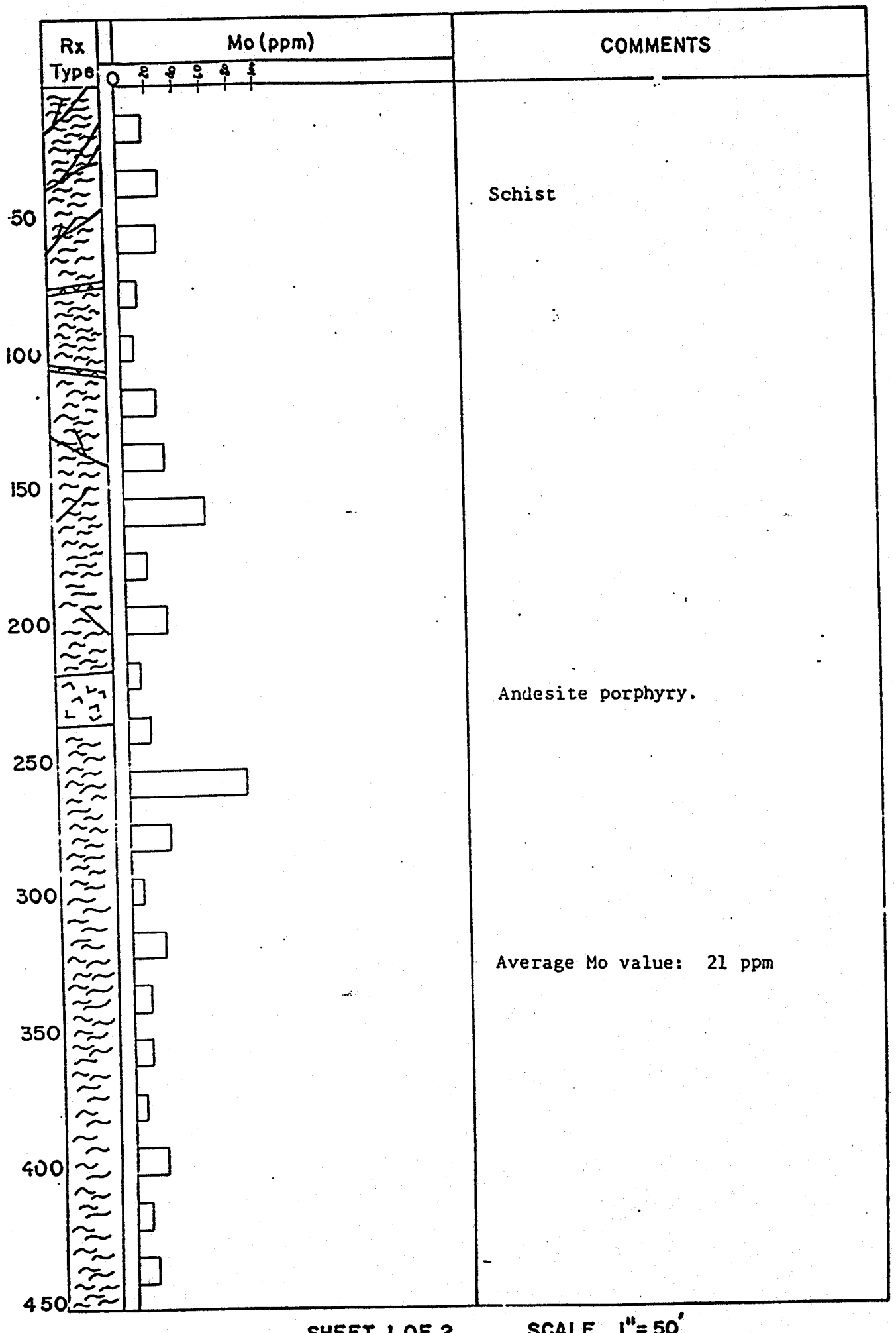
SCALE 1" = 50'

ROTARY HOLE LP-4



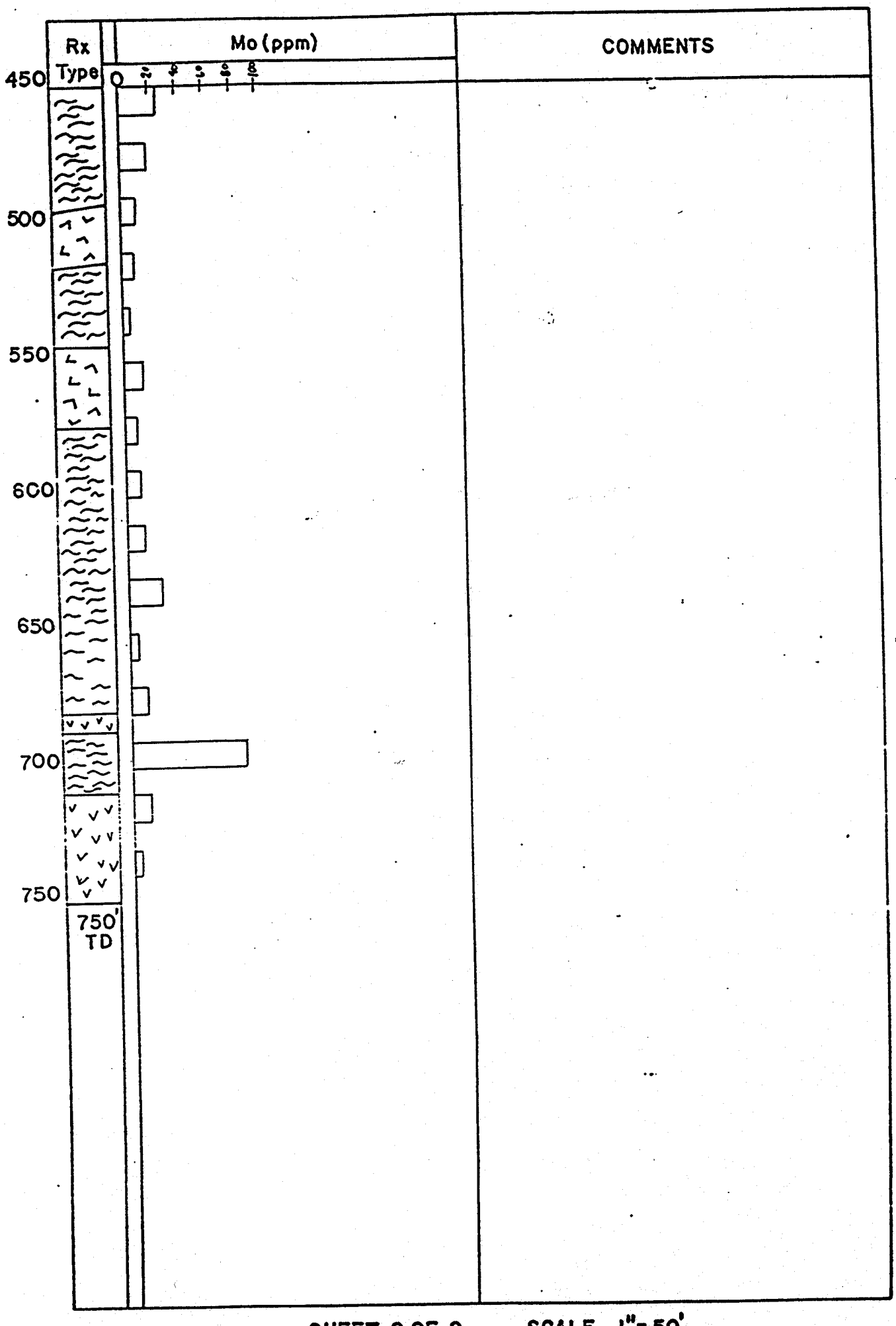
SCALE 1" = 50'

ROTARY HOLE LP-5



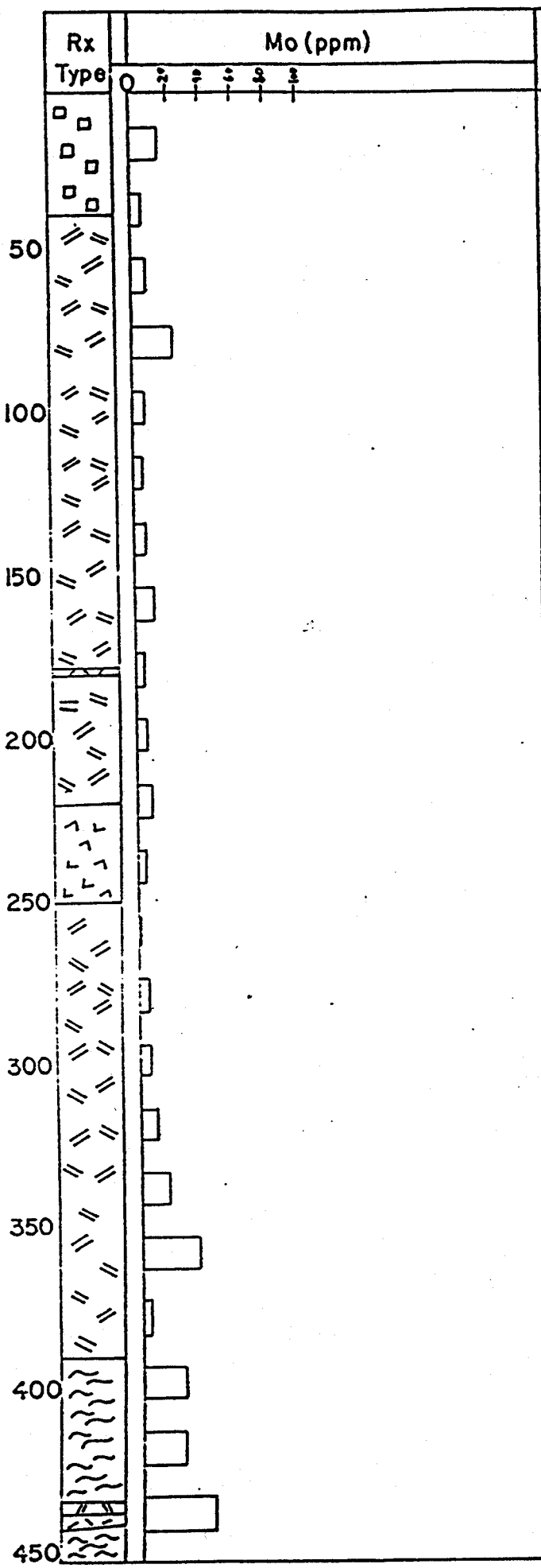
SHEET 1 OF 2 SCALE 1"=50'

ROTARY HOLE LP-5



SHEET 2 OF 2 SCALE 1"= 50'

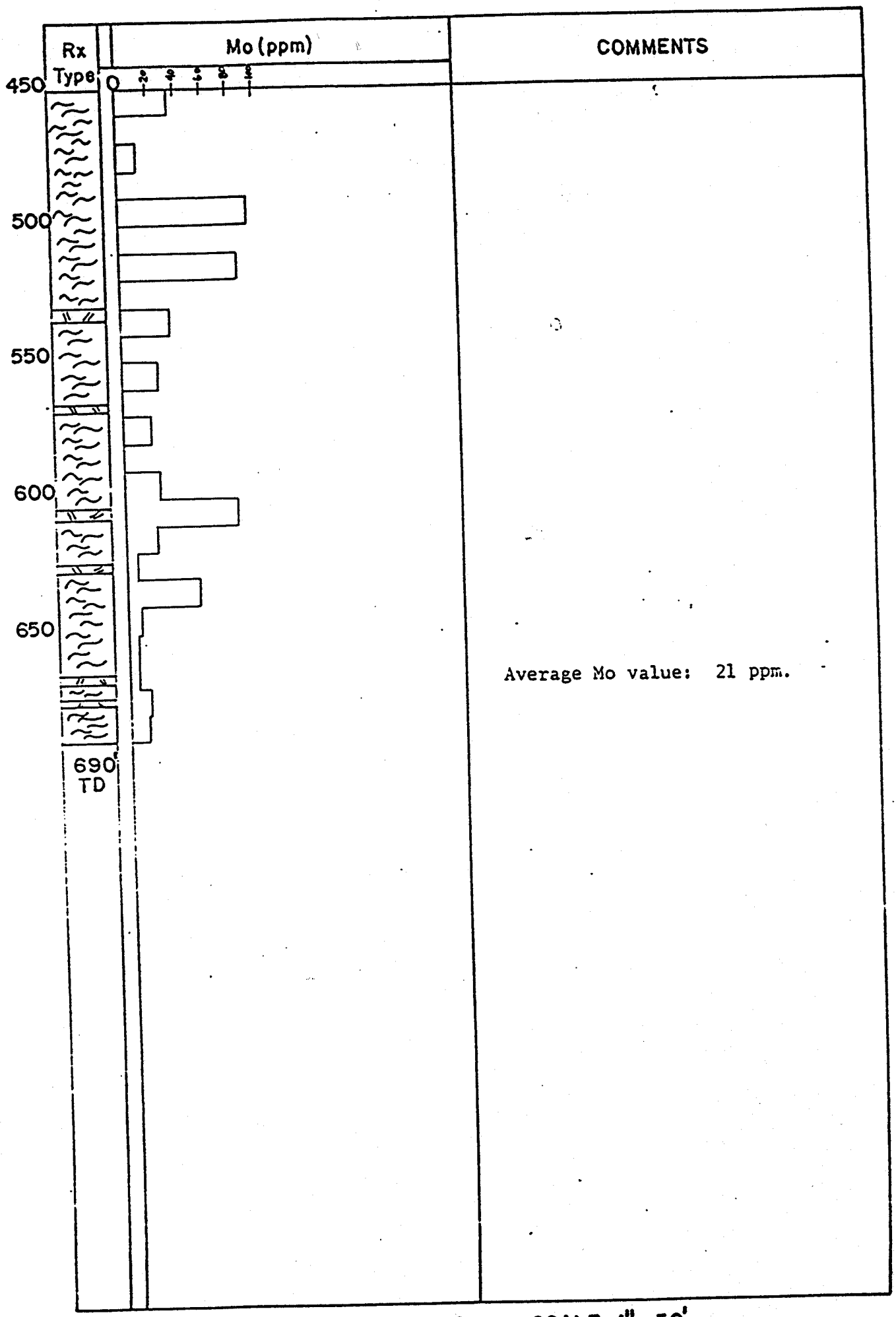
ROTARY HOLE LP-6



COMMENTS
Quartz monzonite porphyry. Abud. quartz veining.."greisen".
Biotite granite.
Porphyritic andesite.
Schist.

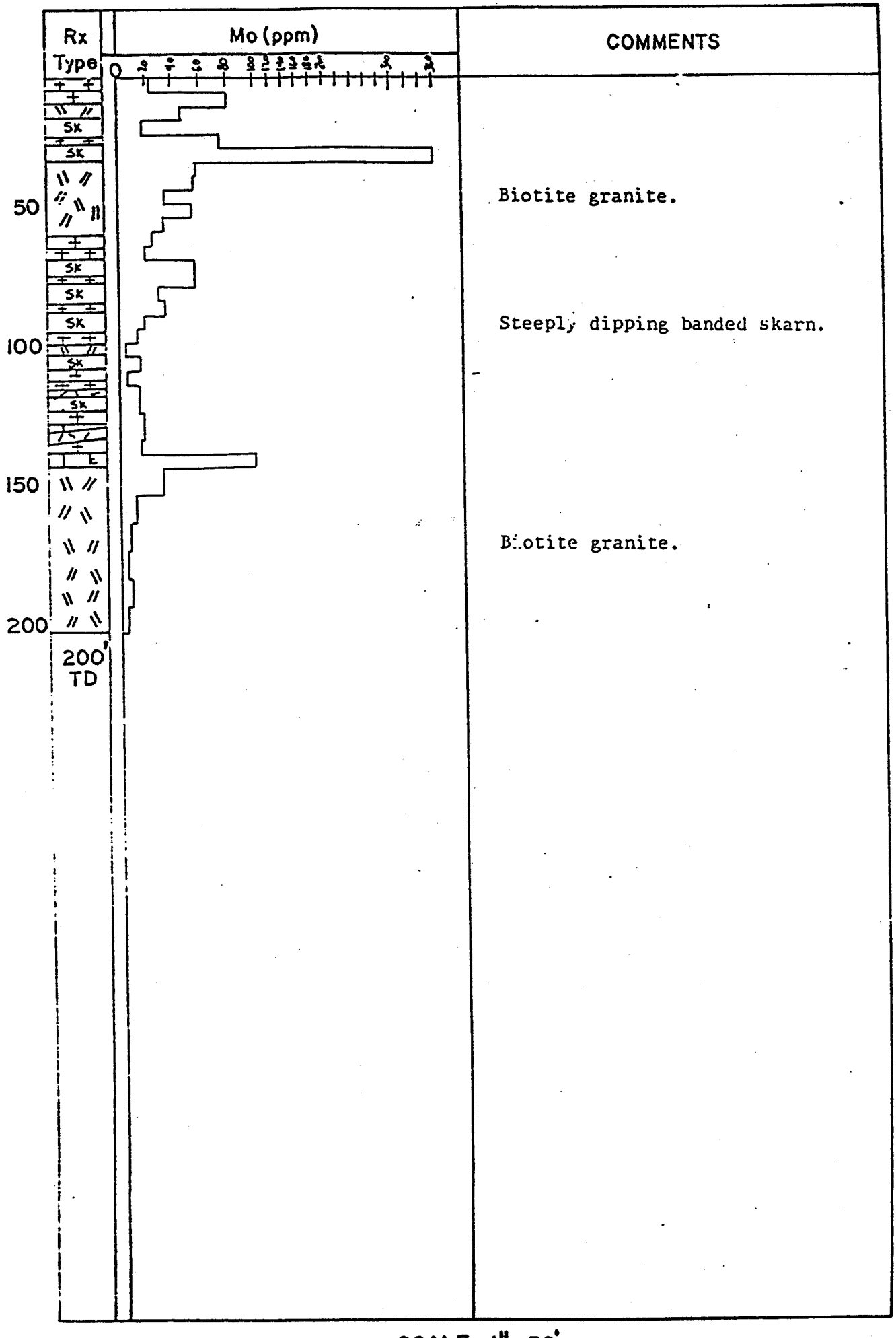
SHEET 1 OF 2 SCALE 1"=50'

ROTARY HOLE LP-6



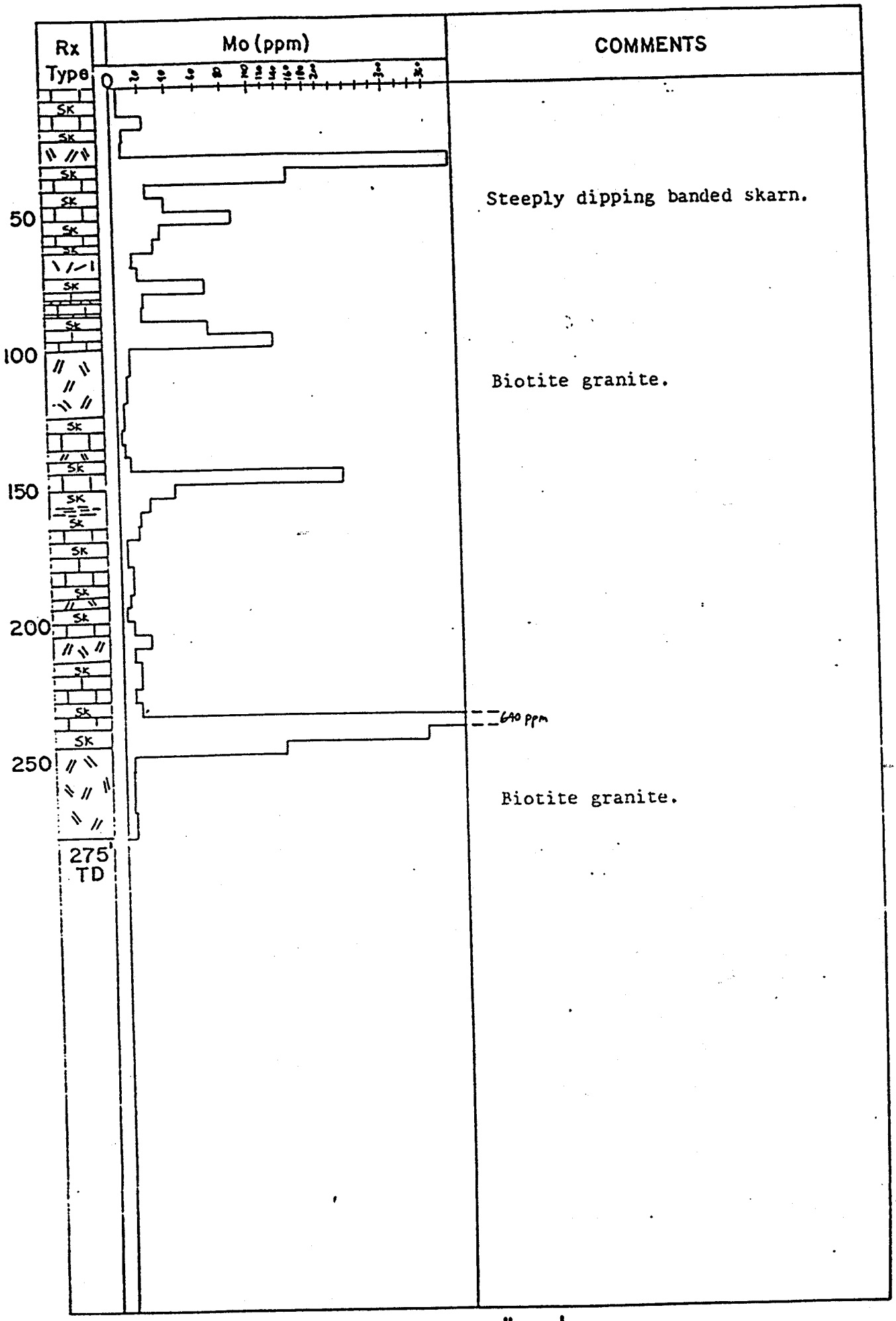
SHEET 2 OF 2 SCALE 1"= 50'

ROTARY HOLE LP-7



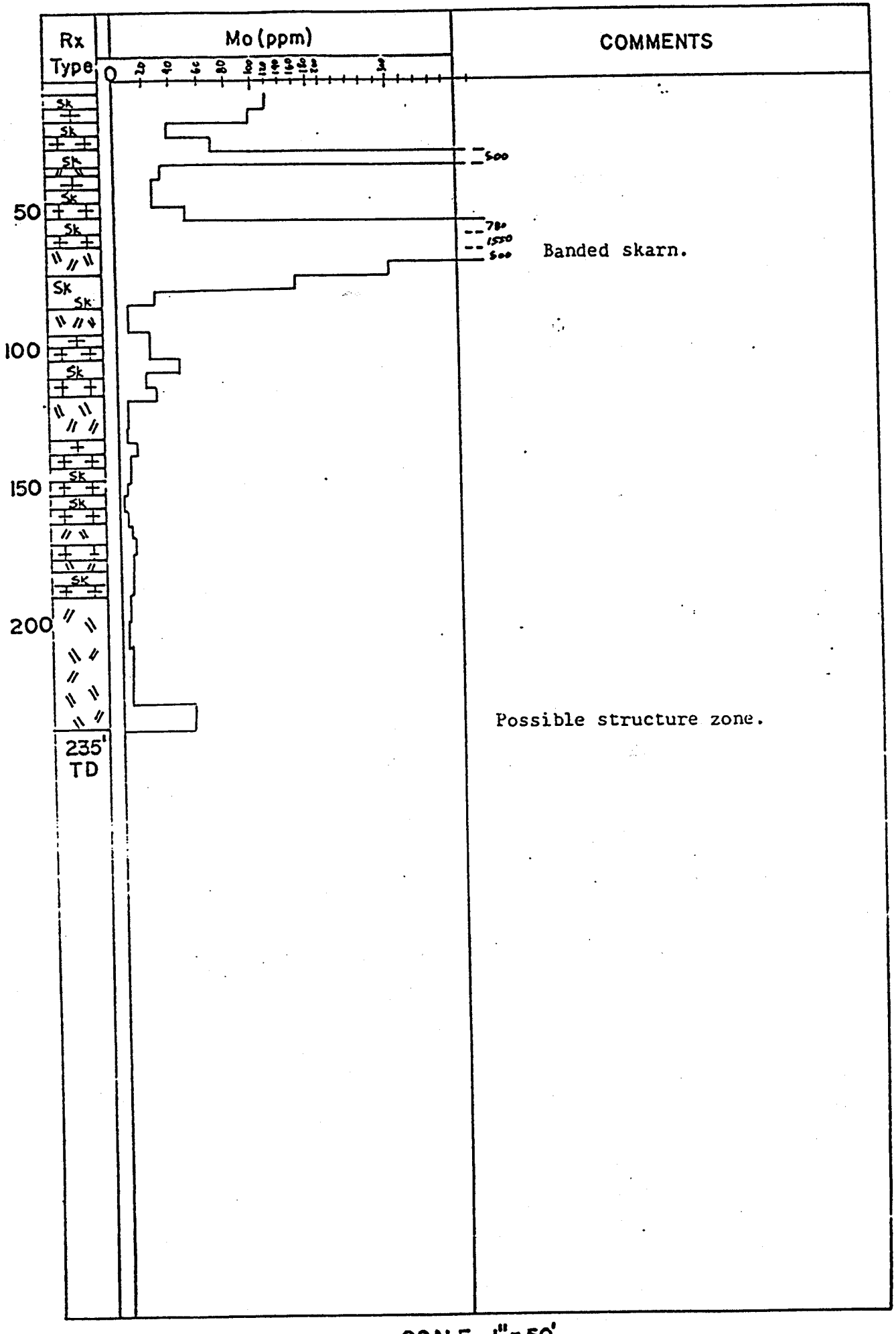
SCALE 1" = 50'

ROTARY HOLE LP-8



SCALE 1" = 50'

ROTARY HOLE LP-9



SCALE 1" = 50'

LA PLATA PROJECT

Geologic Model

Development of Mineralized Skarns

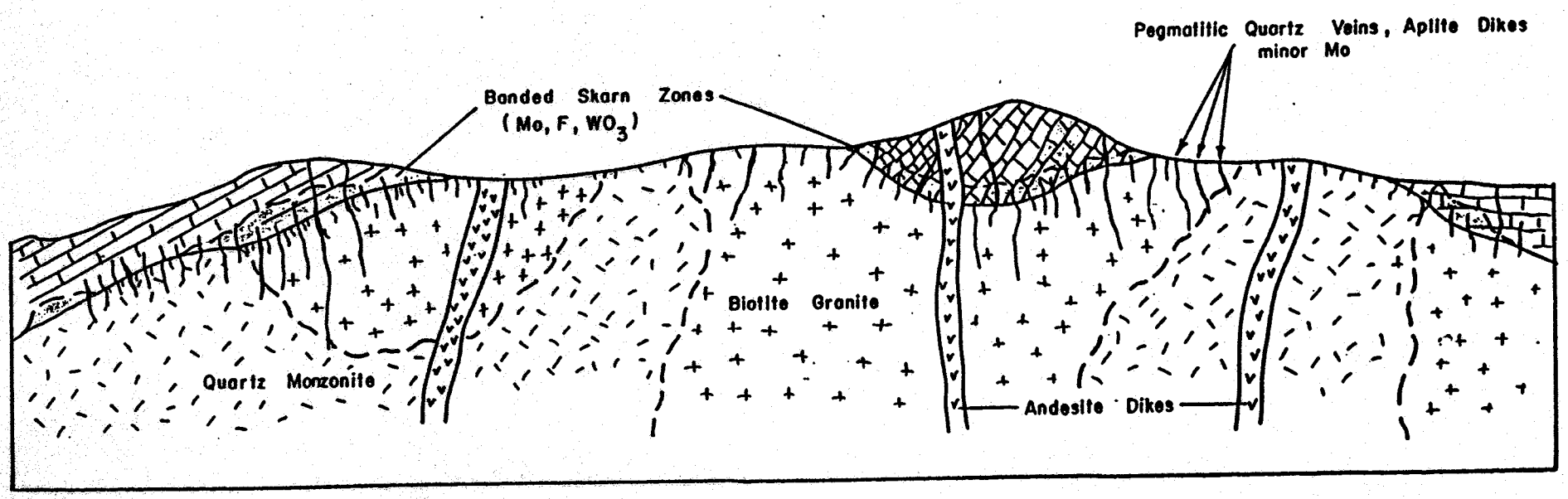


Figure 2.

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu/Sn	As/Sb	Ag °/T	F/W	
18-33-8-7	●	60	20	35	Nd	Nd / Nd	Nd	Nd	Tonalite porphyry: 70% plagioclase, 18% quartz, 6% hydrobiotite, 2% sericite + Muscovite, ½% clinozoisite, ½% sphene, 2% goethite. Alteration: Mesozonal, Ca-cont.
8	●	1697	45	371	Nd	Nd / Nd	Nd	Nd	Coarse quartz / calcite vein: walls are hornfels MM of calcareous seds. (diopside + hydrogrossular)
9	●	3076	44	645	28	Nd / Nd	Nd	Nd	Calcareous shale: 47% plagioclase, 32% diopside, 5% hydrogrossular, 3% quartz, 3% apatite, 4% sphene, 1% Molybdenite. Alteration: upper Mesozonal MM; slight retrograde
10	■	9260	195	951	Nd	Nd / Nd	.60	149	Calc-silicate hornfels: much calcite, hydrogrossular, some pieces rich in MoS_2
11	●	14	51	19	Nd	Nd / Nd	Nd	Nd	Granite (runite): 31% microcline, 26% quartz, 20% plagioclase, 2% hydrobiotite, 1½% sericite, Tr. pyrite. Little or no alteration.
19	●	Nd	29	174	54	Nd		1000 / Nd	Cherty limestone: 69% calcite, 15% quartz, 11% ~~[illegible]~~ grossularite, 3% scawtite, 2% vesuvianite, Tr. Kilchoanite. katazonal MM alteration
20	■	20	41	326	53	Nd		500 / Nd	tactite: Mostly diopside + garnet, some retrograde ~~[illegible]~~ chlorite. synmetamorphic glassy quartz veins
21	■	37	50	293	55	Nd		270 / Nd	Meta-limestone: Quartz + calcite + grossularite + tremolite. shot with dikelets of tonalite (w/ fresh quartz + plagioclase)
22	●	152	214	543	117	2725		120 / Nd	Intrusive: 55% quartz, 40% sericite, 1% leucoxene, 4% FeOH / jarosite. Alteration: crushing / strong epizonal
23	●	1740	48	390	52	Nd		340 / Nd	limestone: 51% wollastonite, 38% diopside, 8% calcite, 1% quartz, 1% grossularite, 1% plagioclase, Tr. molybdenite. katazonal MM alteration

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	As	Ag °/T	F/W	
18-33-8-24	●	19	59	100	66	Nd		70 / Nd	Quartz monzonite: 39% quartz, 38% microcline, 27% plagioclase, 1% biotite (bleached) ± leucoxene, Tr. sulfides (ox) weak deuteric alteration
25	●	11	30	415	58	Nd		1300 / Nd	limestone: 49% calcite, 28% wollastonite, 13% diopside, 8% grossularite, 2% quartz. katazonal MM alteration
28	■	23	68	259	73	177		400 / 1547	Meta-limestone (epizonal): calcite + quartz + amesite; quartz + calcite veining.
29	■	62	180	762	54	Nd		600 / Nd	Banded marble-hornfels: quartz + chlorite + actinolite
30	▲	53	37	233	65	Nd		750 / Nd	
44	●	4					.04		
45	●	2							
46	●	12					.08		
47	●	3							
48	●	11					.02		

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu				
18-33-8-49	●	2							

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	As	Ag %	F/W	
18-33-9-16	▲	12	54	162	184	145		170/Nd	
17	■	109	164	43	359	362	.50	130/Nd	Coarse glassy vein quartz: much fractured with sericitic selvages, Minor pyrite.
18	■	109	50	67	180	Nd		170/Nd	Gneissose, FeO_x-stained diorite with chloritized mafites, sericitized plagioclase.
26	●	11	62	53	46	Nd		180/Nd	Granodiorite porphry: 55% plagioclase, 22% quartz, 9% hornblend (→ prechlorite + epidote) 11% biotite, 8% orthoclase deuteric alteration
27	●	11	58	33	55	Nd	.03	90/Nd	Quartz monzonite: 40% plagioclase, 30% quartz, 28% microcline, 2% biotite → clay + leucoxene ½% sulfides (mostly FeS_2) Mild, epizonal alteration, plagioclase → epidote + sericite.

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	As	W	F	
18-33-16-5	■	10	46	189	44	Nd	Nd	600	Meta-limestone: banded calcite w/ quartz, grossularite, tremolite.
6	■	14	34	194	45	Nd	Nd	500	Spotted marble: calcite + quartz + tremolite + grossularite.
11	■	84	36	213	76	670		610	intimately brecciated black shale: cemented by coarse, goethite-stained calcite.
12	■	991	43	1190	68	5150		310	Cindery goethite gossan: veined with hisingerite; minor spicular calcite in voids.

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

GRID SAMPLES

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Au	Zn	Ag	V	As	Co	
50E 57N						78			ls;calcite,carbonaceous matl,mn.qtz,FeOx-in calcite veins, epizonal meta.
58N						357		10	metashale;qtz,large andalusite(chiastolite) grains,sericite,biotite,much carbonaceous matl;FeOx;mesozonal meta.
59N						28			ls;calcite,mn.qtz,sericite,abd.carbonaceous matl;epizonal meta.
60N						608			metashale;quartz,sericite,clots of coarse andalusite(chiastolite);carbonaceous matl; FeOx; mesozonal meta.
61N						95			ls or impure ls;calcite interlayered w/shaly bands of quartz sericite,carbonaceous material, FeOx; eipzonal meta.
62N						43			ls;calcite,mn.qtz,sericite;tr.chlorite(clinochlore); abd. carbonaceous matl, tr. FeOx; epizonal meta.
63N									ls;calcite,mn.qtz(-5%);tr. sericite;mn.spotty carbonaceous material;trace FeOx;epizonal meta.
63.5N		50		241		131			chertstone bx;abd.f.qtz.;tr.sericite&chlorite; abd.carbonaceous material;minor FeOx; epizonal.
64.5N						49			ls;calcite;minor quartz,sericite&chlorite(amesite), carbonaceous material,FeOx; epizonal meta.
65N		2				203	301		shale/metashale;abd.sericite,qtz,mn.calcite; banded carboanceous matl.tr.apatite; pyrite-completely FeOx;epizonal

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu				
169									granodiorite - alteration feeble, epizonal (deuteric?)
170									tonalite - alteration mild, epizonal (weak greisenization)
171									vein qtz, greisenized silvages, rather fresh looking intr. wall rock; some pyrite - completely to FeO(OH)
172									massive vein qtz, slightly vuggy, some dissem. pyrite-mostly oxidized to goethite, minor hisingerite & jarosite; trace chalcopyrite.
173									vein qtz; fresh-looking, leucocratic intrusive, a few relic pyrite(only molds)minor hisingerite, goethite.
174									shattered vein quartz(greiseny)w/minor muscovite abund. FeOx(goethite, minor hisingerite) mostly from pyrite.
175									granodiorite - alteration feeble, epizonal (deuteric?)
176									crackled vein qtz; minor calcite, tr. sericite/clay; hematite, goethite and minor jarosite - along fractures.
177									andalusite hornfels-from shale - alteration mesozonal metamorphism with strong retrograde alt.
178									leucocratic intr-tonalite in compos.; qtz, plagioclase-partly sericitized, mn. muscovite; small(-0.5cm. wide)qtz veining; jarosite & minor hisingerite/goethite.

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu				
179									massive vein qtz, generally barren; tonalitic wallrock w/qtz,sericitized plagio,mn. rutile(in coarser muscovite);FeOx(jarosite, minor hisingerite)
180									greiseny, massive vein qtz; mn.patchy muscovite FeOx(hisingerite,jarosite);mn.chalcocite (after cpy), trace argentite.
181									massive vein qtz;relict patches of tetra.surrounded by partzite,bindheimite;also mn. brochantite,chlorargyrite;FeOx(incl.hematite)gangue incl.patchy musco/phlogopite
182									tonalitic intrus;qtz(incl.lenses)plagio-sericite some FeOx(hisingerite,goethite,jarodite) in fracts,or isolate blebs(all from pyrite)
183									barren massive vein qtz; mn.k-feld in veins; fresh looking intrusive(granodiorite) wall rock with muscovite.
184									greiseny vein qtz w/muscovite, rutile; minor FeOx (mainly jarosite).
185									milky vein qtz q/patchy chalcocite surrounded by brochantite, minor malachite,tr. relict pyrite/chalcopyrite & also trace partzite(?)-(Cu astimonide)
186									vuggy, massive vein qtz, minor muscovite, sericite(fine-patchy, after plagioclase inclusions); relatively abundant jarosite.
187									massive vein qtz w/granodior(?)wallrock;some muscovite-in wallrock&along vein selvages;FeOx(hisingerite)-pseudomorphs after py. SEE APPENDIX
188									granodiorite porphyry - alteration deuteric (or mild, epizonal)

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu				
189									ls/calc-sediment w/calc-shale intercalation. epizonal alteration
190									ls/calc-sediment - alteration epizonal meta.
191									meta calc-shale - alteration epizonal meta.
192									carbonaceous silty arkose - alteration epizonal meta
193									calc-sediment - alteration epizonal?
194									sediment - alteration epizonal
195									impure limestone - alteration epizonal
196									shattered limestone, healed by recrystallized calcite, minor quartz, sericite, trace leucoxene and -2% FeOx.
197									limestone - alteration epizonal meta
198									ls w/some calcite veining,carbonaceous and mn quartz and sericite-each no more than 2 or 3%-, a few specks of pyrite-completely to FeOx

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu				
199									cherty limestone - alteration epizonal meta
200									limestone - alteration epizonal meta
301									metasediment; shale; alteration mesozonal meta retrograde.
302									calc-sediment - alteration epizonal meta
303									carbonaceous limestone;recrystallized calcite-incl.veining, trace FeOx; minor quartz (-5%), trace sericite,clinochlore/amesite; epizonal meta.
304									limestone - alteration epizonal meta
305									limestone - alteration epizonal (rex'lized)
306									metasediment - alteration mesozonal meta; some retrograde alt.
307									metasediment - alteration mesozonal meta;strong retrograde
308									carbonaceous limestone, with some later calcite veining, minor sericite - 2%, trace quartz, minor FeOx

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	Ag	As	V	
309									metasediment (much shattered - bx) alteration epizonal meta - was pyrite-rich
310									bx-argillite;v.f.qtz,sericite,carbonaceous matl cemented by lacy vein qtz;minor fluorite (coarse cubes),FeOx(mostly goethite) in fractures
311									massive to f. dense vein qtz w/inclusions of dark, quartzite fragments, minor FeOx (hematite/goethite), trace calcite.
312									limestone (slightly cherty) - alteration epi-zonal
313									leucoquartz monzonite (granitized?) - alter-ation deuteric.
372								240	metased;f.qtz&sericite w/andalusite porphyro-blasts now completely retrograded to coarser sericite clots;also abd.hydro-biotite replacing chloritoid? SEE APPX
373								22	meta ls; abd.calcite,minor muscovite,amesite, FeOx, carbonaceous material.
374						.07		28	meta ls; abd. calcite;less quartz-as lenses-w/sericite/muscovite;FeOx;minor leuco-xene; carbonaceous material.
375									dolomite-probably a former fossiliferous ls-now only minor calcite mixed w/cherty qtz and FeOx;minor cabonaceous matieral; FeOx along fractures.
376								131	chertstone;f.dense xline bounded qtz;may have coarser,streaky qtz lineations or lenses minor calcite&v.f.sericite;carbonaceous matl;tr.leucoxene,(opaque)tr.minor FeOx

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	Ag	Au	V	
377								230	argillite(slate);abd.sericite,qtz,FeOx w/carbonaceous material; trace tourmaline
378		3				nd	nd	162	
379		3				nd	nd	280	
380						nd	nd	16	
381								181	tonalitic dike(?);completely altered;abd.qtz, sericite,minor calcite,leucoxene,jarosite; rock probably was granophyric.
382								54	meta ls; mainly caclite,minor sericite-well disseminated;tr. fine quartz-in minute fractures; minor hematite-along fractures
383						.03		67	ls; fine clacite; minor, sparse muscovite; carbonaceous matieral; minor pyrite-FeOx.
384		3				.03	nd	19	
385									dolomite;(dolomitized ls bx);mainly dolomite very coarse, minor calcite, coarse apatite, quartz, carbonaceous matieral, tr. sericite; FeOx.
386						.07		110	meta-calc-sed.;f. quartz,sericite,calcite(-40%) all banded w/a few relatively thick bands of allophane;trace tourmaline, minor FeOx.

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	Ag	As	V	
387									dolomite;minor quartz(coarse, clusters),carbonaceous matieral; trace FeOx
388						.03			meta ls; abd. caclite, minor(-5%),scattered sericite;trace quartz;trace fine carbonaceous material, minor hematite blebs.
389		3						16	vein; fine quartz w/some calcite filling fractures; minor tourmaline(colorless);apatite(colloophanic clusters); trace leucoxene, minor FeOx, MnOx.
390									ls; abd. calcite, carbonaceous material; minor trace quartz, FeOx, chlorite.
391								38	meta ls; relatively coarse calcite, less quartz minor/trace sericite; carbonaceous material; FeOx.
392									ls; mainly calcite-fine and laminated; minor quartz; carbonaceous matieral; FeOx
393								261	metased; quartz,sericite-including pseudomorphs after anadalusite, carbonaceous material FeOx (geothite)
394						.02		49	ls; calcite, fine, lineated; minor sericite, quartz, abund. carbonaceous matieral; trace FeOx.
395									ls, carbonaceous, similar to above w/minor/tr. quartz, sericite, FeOx
396									ls(sedimentary); w/minor quartz, patchy earthy hematite; much goethite on surface.

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	Ag	As	V	
397		56						16	veins;quartz w/minor calcite veinlets, sericite carbonaceous material; FeOx(hematite/goethite).
398									coarsely crystalline ls;calcite,minor quartz, less/trace muscovite/sericite;trace carbonaceous material; trace pyrite-FeOx
399		23				.08	153	548	bx-argillie/metashale fragments;mainly fine qtz &sericite;cemented by vein qtz,carbonaceous matl;minor caclite;dissem.pyrite-hisingerite.
400		3					402	77	fine-grained ss; fine quartz, minor apatite, rutile/leucoxene; zircon; FeOx
601									crystalline ls; coarse calcite, minor quartz lenses; sericite, FeOx (geothite-from disseminated pyrite)

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Au	Zn	Ag	V	As	Co	
50E 66N									ls;streaky calcite-also veins-;abd.carbonaceous matl;minor quartz,sericite;epizonal meta
67N		7			.03	38	139		bx of andesite;bounded fragments may be of fresh,f.plagio.or may be speckled w/f. sericite;matrix of thick,f.sericite and mn qtz; SEE APPENDIX
67.5N						15			dacite(granophyric)-dike(?);qtz,plagio,sericite leucoxene,tr.zircon,apatite;FeOx;rock looks shattered; alter. moderate epi-zonal
68N						25			andesite bx(agglomeritic?)abd.plagio,mn.qtz, some seritie;FeOx(-5%);mild, epizonal
69N		3				49			andesite-flow bx(?);abd. plagio.mn.qtz,moderate abd.sericite;leucoxene & FeOx; moderate epizonal (meta?)
69.5N						73			metavolc(?);abd.chlorite(clinochlore/amesite); lesser amt.of sericite,calcite,qtz;re-latively abd.leucoxene;minor FeOx(tr); epizonal
72									ls;calcite,mn.qtz,mn.FeOx,carbonaceous matl; rock has been shattered;rexlized;epi-zonal
52E 57N									limestone - alteration epizonal meta.
58N						38			limestone
59N									limestone - alteration epizonal meta.

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Au	Zn	Ag	V	As	Co	
52E 60N		3				33			limestone - alteration epizonal meta.
61N				80					limestone - alteration rexlized, epizonal?
62N									ls,mn.sericite&amesite(each -2%),tr.FeOx;epizonal meta.
63N							266		ls(biogenic)calcite(incl.mn.aragonite),quartz (-4%);tr.amesite;minor FeOx;epizonal meta
64N		3		193		104			calc-sediment;calcite,carbonaceous material; minor chlorite(amesite);FeOx;epizonal meta
65N		3			.02	48	127		ls;granular calcite,mn.qtz,sericite,FeOx(goethite)minor carbonaceous material; epizonal meta.
66N						21			meta ls;coarse,bladed calcite,qtz,garnet,epidote;dark,carbonaceous matl;mesozonal meta.
68N						87		10	metased(?);abd.tremolite-actinolite,qtz,minor sphene;epidote(vein);pyrite dissem.-completely to FeOx; upper epizonal meta.
69N		3		87		33			ls;relatively coarse calcite-incl.veining;mn. qtz,sericite;abd.carbonaceous matl;diss. pyrite-completely oxidized(FeOx)
70N				<10		18			ls;f.calcite;some sericite,mn.amesite,qtz,carbonaceous matl,FeOx(geothite,magnetite?) epizonal meta.

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Au	Zn	Ag	V	As	Co	
52E 71N				175		250			completely silicified bx;qtz-may be cherty/finely crystalline&dense;mn.epidote;abd.carbonaceous matl;tr.calcite;FeOx;epizonal
72N				223		301			metased(?);qtz.k-feld,actinolite/tremolite,epidote;mn.relict diopsite;tr.hyrdobiotite, magnetite(-3%);mn.pyrite-FeOx(incl.hisingerite);mesozonal meta(retrograde)
54E 55N						14			ls;calcite w/abd carbonaceous matl,mn qtz;coarse diopside grains along coarse vein calcite roughly parallel to bedding;mesozonal meta.
56N				92		230			meta ls;calcite,carbonaceous matl,mn.f.qtz;diopside blebs;tr.FeOx(from sparse pyrite)
56.5N		3	.27		.12	57			bx of carbonaceous shale w/f.sericite,qtz,abd. dark,carbonaceous matl;cemented by qtz; mn.hydrobiotite;epizonal
63N						199			carbonaceous ls;calcite incl.vein parallel to 'bedding';some qtz,mn.sericite;FeOx(goethite,hydrobiotite);epizonal
64N		3				76			arenacous ls;calcite;qtz,mn.sericite;tr.zircon; some carbonaceous matl;dissem.pyrite-all oxidized to FeOx(goethite);epizonal
65N		3			.04	261		11	metashale;f.qtz,sericite(incl.sericitized chiastolite porphyroblasts)biotite,carbonaceous matl;mesozonal meta;somewhat retrograded(?)
66N		2		<10		17			andesite;sodic plagio-most as f.(felted)matrix, some coarser phenos,mn.biorite;sericite, tr.apatite, leucoxene,FeOx(tr);weak, epizonal
67N		3		77		67			rhyodacite/granodiorite porphyry(dike);qtz,plagio.less k-feld.set in f.matrix of similar mineralogy;minor biotite-chlorite, hydrobiotite;epidote SEE APPENDIX

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Au	Zn	Ag	V	As	Co	
54E 68N				10		nd			ls;abd.f.streaky calcite;also veins;abd.carbonaceous matl;minor quartz;FeOx,sericite, hydrobiotite;epizonal meta.
69N		21		182	.09	441			tactite;qtz,calcite,diopside,epidote,garnet,k-feldspar;fluorite;minor apatite,sphene; FeOx(tr);mesozonal meta.
70N				<10		nd			ls;caclite-incl.x-cutting veins;minor quartz, chlorite(clinochlore)tr.sericite;abd. carbonaceous matl; epizonal meta.
71N				89		139			meta ls;abd.calcite;actinolite(-15%)minor qtz; epidote;tr.carbonaceous matl;diss.pyrite FeOx; upper epizonal meta.
71.5N				<10		nd			ls;calcite,coarse-rexlized,w/coarse caclite+-qtz veins;abd.carbonaceous matl;mn sericite,less clinochlore;epizonal meta.
56E 55N						81			meta ls;abd.calcite,some relict diopside;mn qtz richly carbonaceous;tr.FeOx,mesozonal
56N						15			meta ls;similar to above; minor dissem. pyrite-FeOx(incl.hisingerite);mesozonal
57N		2				40			meta ls; w/carbonaceous matl;mn.qtz,diopside, vesuvianite;sphene;FeOx;carbonaceous matl;katazonal meta.
58N						36			meta ls;calcite,tremolite,carbonaceous matl; mn quartz;tr.FeOx,minor pyrite in hd. sp.; low mesozonal
63.5N				<10		123			meta ls;calcite,carbonaceous matl;sericite/ muscovite,hydrobiotite, minor quartz; upper epizonal

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Au	Zn	Ag	V	As	Co	
56E 64N		3				98			meta ls;carbonaceous as above;mn.qtz/calcite veining;less amt.of muscovite/sericite; diss.pyrite-all completely to FeOx; epizonal
65N						15			carbonaceous ls; qtz-calcite coarse veining,mn. FeOx, tr. sericite,minor hydrobiotite; epizonal meta.
66N		3				40			carbonaceous ls; mn.quartz,sericite,dissem.pyrite-FeOx, epizonal meta.
67N						133			metased.abd.v.f.qtz,carbonaceous matl;some actinolite/tremolite,caclite;vesuvianite (viluite)FeOx(from pyrite-in vein); katazonal meta.
58E 51N		4				245			meta ls;rather schistose;abd.wollastonite,coarse diopside,f.plagio;mn.garnet,sphene/leucoxene,calcite,k-feldspar,apatite,FeOx; katazonal
52N						20	165		limestone;calcite-incl.veins,very carbonaceous minor quartz;v.sparse pyrite-FeOx; epizonal
56N									ls;subrounded,granular cal;mn.clinochlore/amesite;tr.apatite,mn.FeOx in fracts & interstices;low epizonal meta.
57N						21			meta ls;f.calcite,carbonaceous,mn.qtz,tremolite tr.dipside;tr.FeOx,low mesozonal
59N					.03	75			meta ls; f.calcite,carbonaceous,mn.diopside,qtz sparse pyrite-partly FeOx;mesozonal
67N		3				287			ls; abd.carbonaceous matl;mn.sericite,qtz,clinochlore,dissem.pyrite-all to FeOx; epizonal

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Au	Zn	Ag	V	As	Co	
60E 50N						25			calc.sed;abd.cal w/interlayerd(veined)qtz,sericite,mn.clinochlore;leucoxene;abd.FeOx from pyrite;tr.gypsum(bassanite);epizonal.
51N						28			meta ls;abd.calcite,strong carbonaceous,mn.qtz, some diopside,mn.tremolite(?);mesozonal meta;minor FeOx(mostly from pyrite diss)
52N		3				49			meta ls;abd.aragonite,incl.coarse lenses w/qtz; abd.carbonaceous matl;minor FeOx; trace leucoxene;epizonal
53N		3				32	143		ls;mainly calcite-seems brecciated;minor quartz (-10%); very carbonaceous;trace leucoxene;minor FeOx;epizonal
55N					.03	187			meta-shaly sed;abd.sericite,less f.qtz;completely sericitized andalusite porphyroblasts some biotite-partly to prochlore;abd.carbonaceous matl;mesozonal(retrograde)
56N					.02				meta ls;calcite,minor tremolite,quartz,trace leucoxene;pyarite-FeOx;low mesozonal
65N						17			meta ls(bx);calcite,relatively abd.sericite(phlogopite);strongly carbonaceous,also vein calcite(hd.sp.-v.weathered);mn FeOx low mesozonal
66N		50				187			marble/schist;abd.'tremolite'some diopside,mn. garnet,tr.sphene;also mn.k-feldspar;calcite;mesozonal meta - maybe tactite.
67N									ls; calcite,mn sericite/muscovite; trace quartz somewhat carbonaceous;epizonal meta.
61.5E 66N		3				72			andesite(slightly autobrecciated?)mainly rubbly plagioclase set in fine matrix of plagioclase-clay,Fe-rich Calcite;much epidote both replacing phenocrysts SEE APPENDIX

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Ag	V	As	Co	
68E 60N		4				309			metased(mesozonal)qtz,sericite,biotite(-prochlore);andalusite porphyroblasts-sericite muscovite&qtz,abd.carbonaceous matl; FeOx(mostly in fractures)
70E 50N						29			dacite/rhyodacite porphs-qtz,plagioclase&mn k-feldspar(sanidine)phenocrysts set in f. qtz(mn)&plagioclase matrix;mn.biorite phenos all bleached SEE APPENDIX
52N						318			metashale;f.qtz,sericite,biotite-prochlore;andalusite-muscovite(may have relict nucleii);carbonaceous matl,mesozonal meta.
53N						318		10	metased;(shaly)as above;andalusite porphyroblasts(relict nucleus still survive in many grains)-muscovite;biotite-chlorite; f.qtz&sericite; SEE APPENDIX
54N						230			mesozonally altered sed;similar to others;f.qtz sericite,biotite,abd.carbonaceous matl, completely sericitized andalusite/porphroblasts.
55N						318			similar to above, less carbonaceous and more andalusite (chiastolite)-sericite
56N		2				230			metashale of the same chiastolite-sericite porphyroblastic type-richer in fine sericite,biotite-partly to chlorite/prochlore
60N						199	92		metashale(mesozonal)similar to others but lacks carbon.matl;clusters of biobite haloed by coarser sericite occupy what had been andalusite porphyroblasts SEE APPENDIX
62N 64E		15			.03	123	96		metased;abd.sericite(incl.muscovite from coarse andalusite porphyroblasts)less qtz,biotite-prochlore;leucoxene;FeOx(along vns fracts)mesozonal; SEE APPENDIX
66E		3				318		12	metased;retrograde meta.abd.sericite,biotite-partly or completely to chlorite;some amphibole(?)-qtz,epidote;FeOx(goethite, hydrobiotite)tr.leucoxene;mesozonal

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Ag	V	As	Co	
62E 53N									limestone;abd.coarse calcite,carbonaceous minor qtz(as lenses or arenaceous pockets)tr. FeOx from pyrite;epizonal
56N					.07	915	117		mixed sediment;silty shale&limestone;abd.quartz sericite,clots of biotite(hydobiotite); calcite(from dirty ls bands)minor leucoxene,tourmaline,FeOx(from py)up.epizonal
57N						230			meta shaly sed;abd.sericite,qtz,coarse andalusite(all sericitized)porphyroblasts,relict chloritoid(chlorite);minor carbonaceous matl;leucoxene;FeOx;mesozonal
64N									meta-ls;calcite,moderately carbonaceous,minor qtz,scattered,coarse sericite(phlogopite) tr. FeOx;low mesozonal
64.25N		32				44	312		crushed(greisenized?)vein qtz;abd.qtz,mn sericite/muscovite;goethite forming part of cement;epizonal
66N									
62.5E 60N								11	meta ls;abd.calcite,carbonaceous,mn.(very small amt.)quartz;FeOx;up. epizonal
64E 53N		3		213		123		15	metased;abd.chloritized-chlorite(FeOx-stained) qtz,less sericite(mostly relic andalusite porphyroblast pseudomorphs),FeOx,carbonaceous matl; mesozonal
54N						199		10	metased;qtz,sericite/muscovite(also replacing andalusite which still occurs as primatic,coarse,nucleii surrounded by sericite)prochlore/chlorite SEE APPENDIX
55N									meta ls;calcite w/coarser veins,carbonaceous,mn quartz;trace FeOx(from pyrite);epizonal

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	V	As		
66E 59.75N		3				309	96		metased(?);what seems to be abd.andalusite porpyroblasts-completely sericitized(muscovite)much qtz;sericite;mn.hydrobio;leucoxene;tr.carbon.matl;FeOx;mesozonal meta
61N		3				409			metased;abd.sericite-incl.those from andalusite porphyroblasts;v.carbonaceous,mn qtz;relict biotite-mostly bleached;tr.FeOx; mesozonal (retrograded)
68E 52.5N						158			metased;mesozonally metamorp.shaly sed;abd.f. qtz,sericite,biotite,porphyroblasts of andalusite(chiastolite)carbonaceous matl mnFeOx;retrograde w/sericite SEE APPENDIX
54N						22	17		wollastonite marble;abd.wollastonite w/vesivianite & diopside subjedral to anhedral(& coarser)xls scattered all over,& calcite in fractures; katazonal meta.
55.5N		3				250			metashale w/porphyroblasts of andalusite(completely retrograde alts to sericite)f.qtz (incl.coarser lenses)biotite,sericite, abd.carbonaceous matl;mesozonal meta.
56N						309			similar mesozonally metamorph.shaly sed to above more abd.chiastolite(andalusite)now completely replaced by sericite/muscovite)
56.5N									meta ls; abd.calcite-much rexlized;abd.carbonaceous matl; some FeOx (from pyrite)
57.5N									
58.5N						301			meta shaly sed;(mesozonal)similar to others w/ chiastolite,(now replaced by muscovite) rich in carbonaceous material
59.5N						199			similar meta shaly sed as above w/altered chiastolite,matrix of f.qtz,sericite,biotite rich in carbonaceous material

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	V	As		
63N 64E						187	149		metased;abd.sericite,incl.relic andalusite porphroblasts,mn.biotite,some qtz,fine leucoxene;mn.(tr) FeOx; mesozonal
65N 64E		3				230	113		dacite(?)strongly altered;abd.sericite,less qtz mn calcite-in fracts;mn.leucoxene,FeOx (mostly goethite from dissem pyrite); epizonal
66N 64E		23				98			vein qtz w/bx inclusions & wallrock of metased. abd.qtz&from sediments,abd.sericite.chlorite/clinochlore from biotite,epidote carbonaceous matl;mn FeOx SEE APPENDIX

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	Ag %			
18-33-5-31	●	2							
32	●	2							
33	●	2							
34	●	2	468	1538		.02			
35	●	2				.02			
36	●	2							
37	●	3				.78			
38	●	32				.04			
39	●	2				.04			
40	●	3							

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Sn ~~Cu~~	Ag °/T	As/Sb	W	
T R Sec Samp No 18-33-5-1	■	46	140	149	Nd	.11	690/Nd	Nd	Coarse bull quartz with goethite (from pyrite) forming films in fractures
2	■	113	143	340	Nd	.72	648/Nd	93	Breccia w/much gossan-like goethite + jarosite (relic pyrite) Includes broken vein quartz
3	●	69	37	43	Nd	.34	257/Nd	93	Leucodiorite: 85% Plagioclase, 7% sericite, 4% goethite, 2% leucoxene, 2% quartz (in crushed zones) Alteration: mild, epizonal
4	●	93	368	43	Nd	.73	268/Nd	132	Leucodiorite: 88% plagioclase, 7% quartz (veins) 2% allophane/opal, 2% sericite ½% leucoxene, ½% jarosite + FeO_x Alteration ~ nil
5	●	11	39	49	Nd	Nd	Nd/Nd	Nd	Tonalite granophyre: 78% plagioclase, 18% quartz, 4% biotite, Tr. sphene + leucoxene ½% FeO_x (sulfides) Weak deuteric alteration
6	■	155	1165	140	Nd	6.4	344/813	Nd	Coarse vein quartz: includes shaley (carbonaceous) foliae; finely diss. pyrite + chalcopyrite, tetrahedrite, Tr. azurite, malachite
12	■	14	44	84	Nd	Nd	Nd/Nd	Nd	Meta-limestone: mostly recrystallized calcite. Prochlorite, hydrogrossular are present also.
13	■	109	593	477	Nd	.10	Nd/Nd	739	Meta-calcareous greywacke/shale: some recrystallized calcite, + hydrogrossular + tremolite
14	■	344	969	141	Nd	3.5	Nd/324	Nd	Bull quartz: with Tetrahedrite, chalcopyrite (Now mostly azurite, malachite, Sb Ox
15	●	102	51	271	Nd	.07	Nd/Nd	Nd	Quartz monzonite: 39% plagioclase, 32% microcline, 14% quartz, 5% clinozoisite, 2% sphene, 2% pennine, 2% hisingerite (from actinolite) Alteration: Mesozonal, Ca-cont.

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu/Sn	As/Sb	Ag°/T	F/W	
18-33-17-1	■	Nd	65	30	Nd	Nd/Nd	Nd	Nd	Granular fluorite vein: with silicified xenoliths. some streaks of quartz. CaF_2 crystals have voids, gark sutite lines voids + fractures
2	▲	84	51	9	Nd	1480/83	.07	Nd	
3	■	109	46	67	Nd	1204/Nd	Nd	Nd	Crudely foliated meta-greywacke: veined with comby quartz and fluorite
4	●	35	60	17	Nd	107/Nd	Nd	Nd	Quartz monzonite: 40% plagioclase, 30% quartz, 25% microcline, 3% sericite, 2% goethite, Tr. anatase. Weak epi-mesozonal alteration.
7	■	235	75	45	107	289		33%/Nd	black carbonaceous shale/limestone almost entirely replaced by fluorite.
8	■	17	68	194	63	Nd		720	Meta-shale/limestone: variously composed of quartz + chlorite + calcite + garnet + wollastonite; veining by quartz + plagioclase. later by calcite.
9	■	15	38	96	38	Nd		5000/Nd	Meta-limestone: coarse quartz bands with crystalline limestone. Some sprays of tremolite.
10	■	12	28	184	41	2299		640	Silicified black shale: severely brecciated and quartz-veined. Anaganeite on fractures

△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

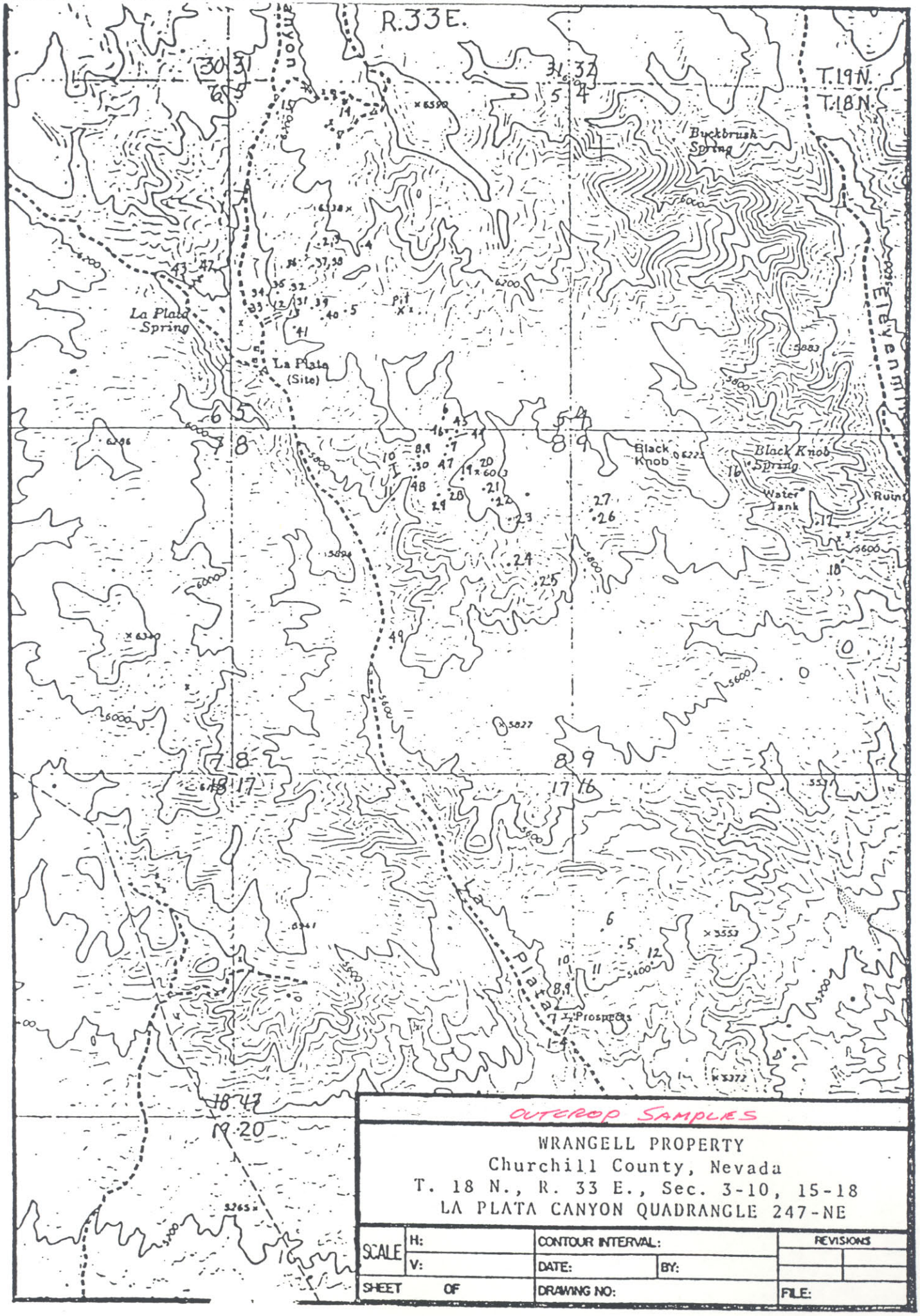
Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu				
18-33-5-41	●	2							

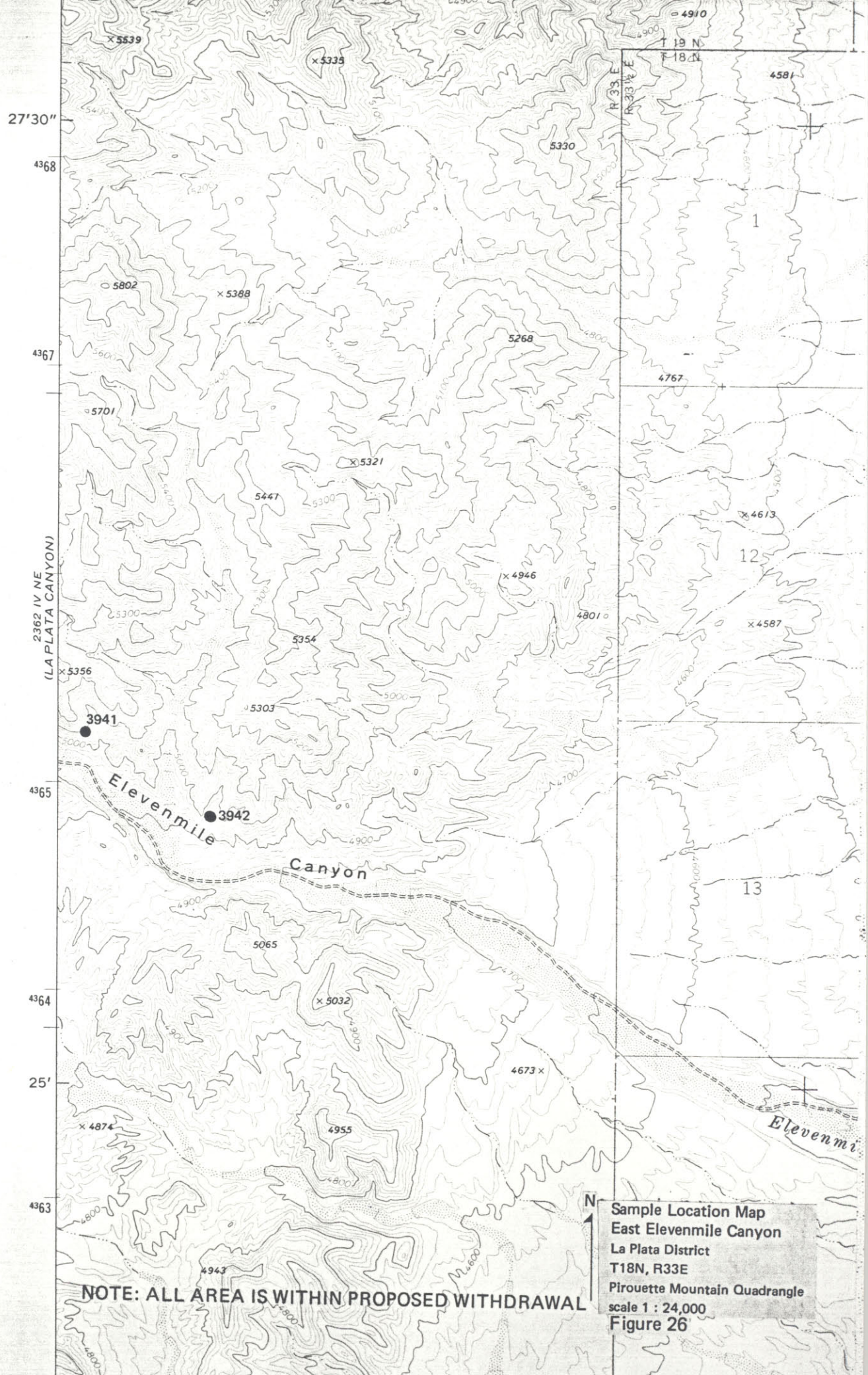
△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay

APPENDIX — SAMPLE DESCRIPTIONS

Number	Type	Geochem (PPM) or Assay							Rock and Description
		Mo	Pb	Zn	Cu	Ag o/T			
18-33-6-42	●	Nd							
43	●	3				.02			

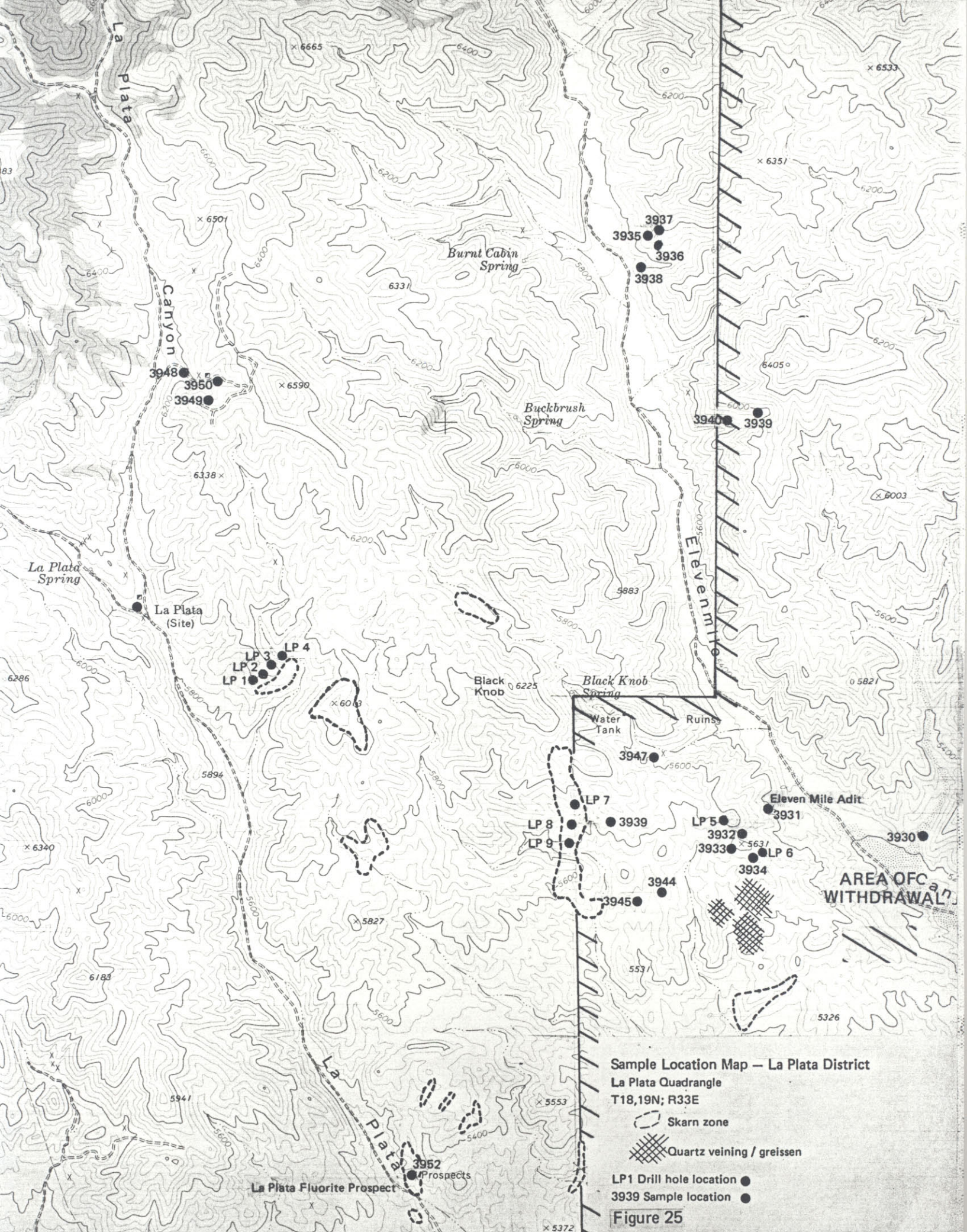
△ = Hand Lens Description, □ = Binocular Microscope, ○ = Thin Section; Solid for Geochem or Assay


R.33E.
T.19N.
T.18N.
Buckbrush Spring
La Plata Spring
La Plata (Site)
Pit
Black Knob
Black Knob Spring
Water Tank
Ruin
Prospects
OUTCROP SAMPLES
WRANGELL PROPERTY
Churchill County, Nevada
T. 18 N., R. 33 E., Sec. 3-10, 15-18
LA PLATA CANYON QUADRANGLE 247-NE
SCALE
H:
V:
CONTOUR INTERVAL:
DATE:
BY:
REVISIONS
SHEET OF
DRAWING NO:
FILE:



Sample Location Map
East Elevenmile Canyon
La Plata District
T18N, R33E
Pirouette Mountain Quadrangle
scale 1 : 24,000

Figure 26



Sample Location Map — La Plata District
La Plata Quadrangle
T18,19N; R33E

Skarn zone

Quartz veining / greissen

LP1 Drill hole location ●
3939 Sample location ●

Figure 25

MEDICINE RANGE, ELKO CO, NEVADA

PLATE I, GEOLOGIC MAP

J. W. COLLINSON, 1966

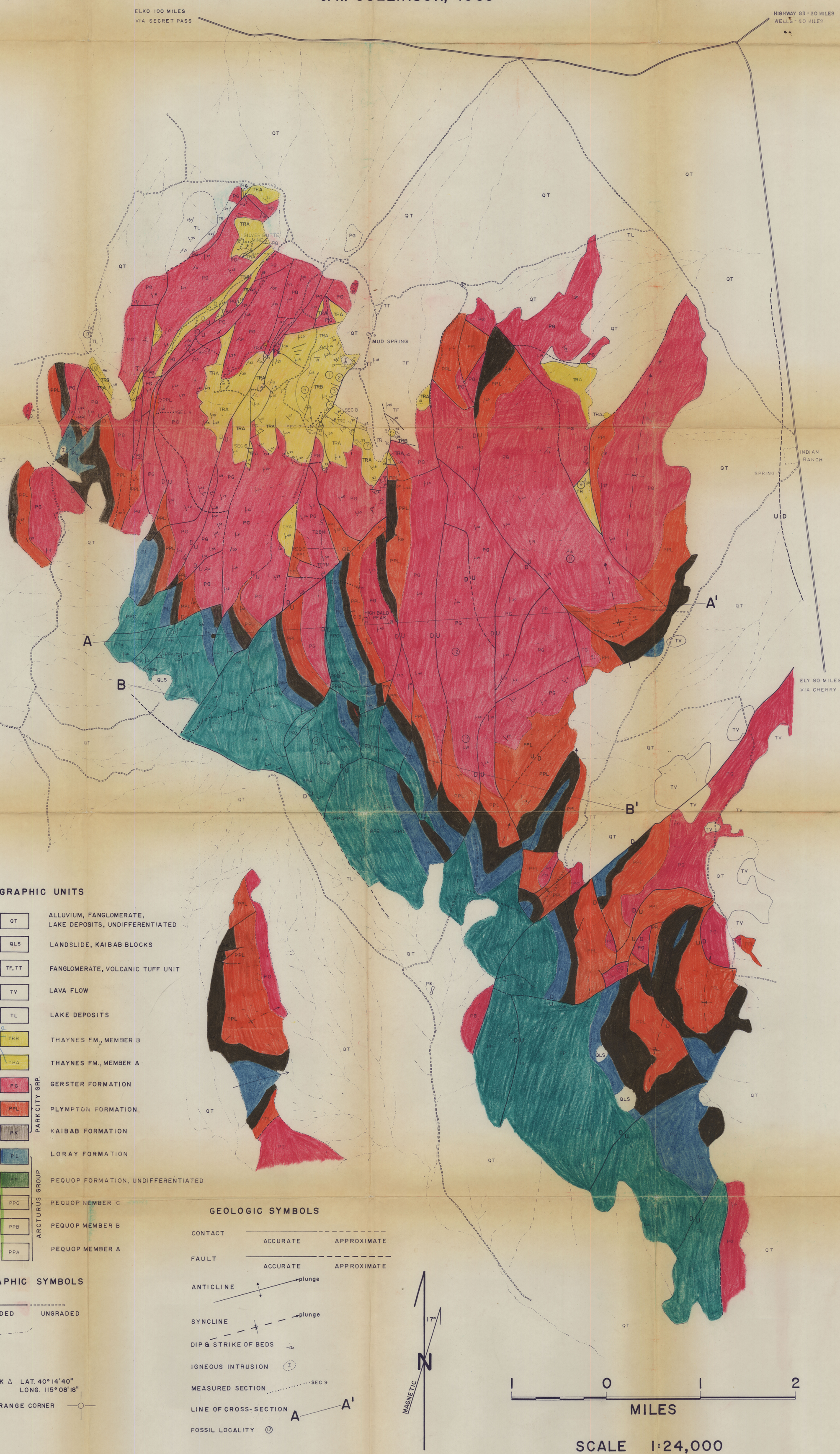
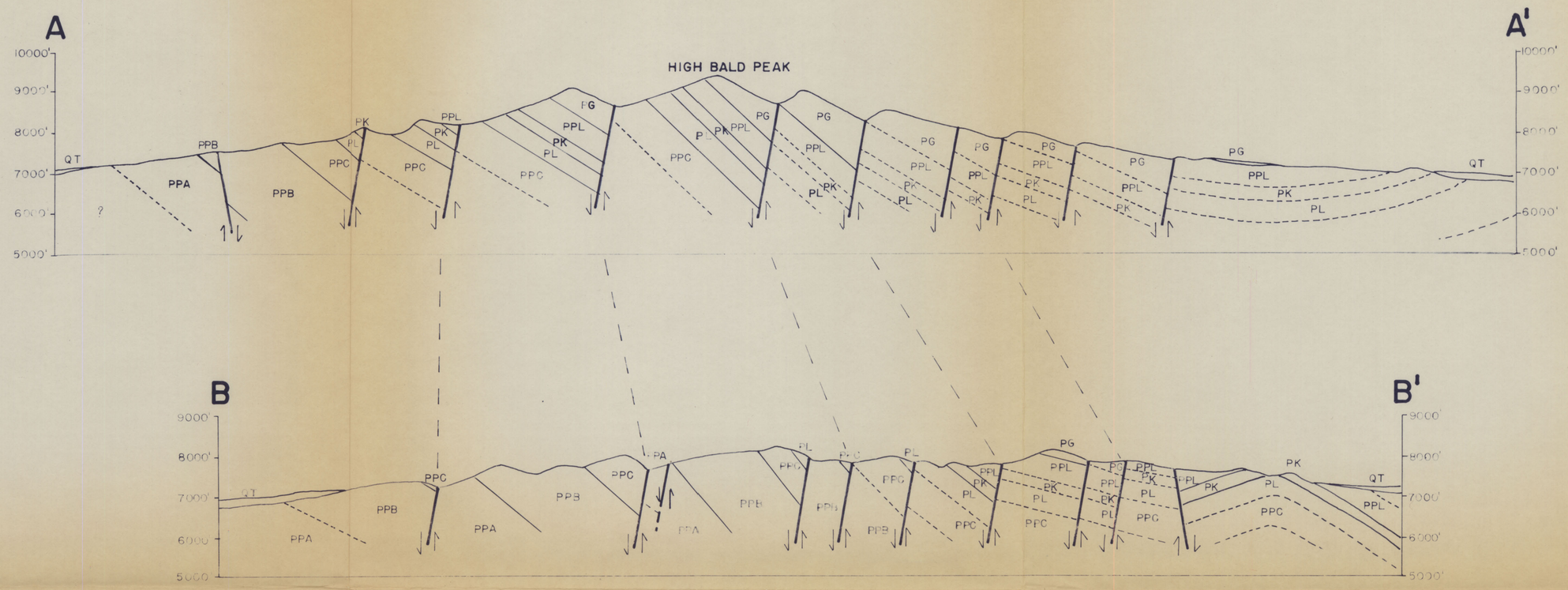


PLATE 2, GEOLOGIC CROSS SECTIONS

MEDICINE RANGE, ELKO COUNTY, NEVADA

J.W. COLLINSON 1966



STRATIGRAPHIC UNITS

QUATERNARY-TERTIARY	QT	UNDIFFERENTIATED
PERMIAN	PG	GERSTER FORMATION
	PPL	PLYMPTON FORMATION
	PK	KAIBAB FORMATION
	PL	LORAY FORMATION
	PPC	PEQUOP FORMATION, MEMBER C
	PPB	PEQUOP MEMBER B
	PPA	PEQUOP MEMBER A

GEOLOGIC SYMBOLS

CONTACT

ACCURATE — APPROXIMATE

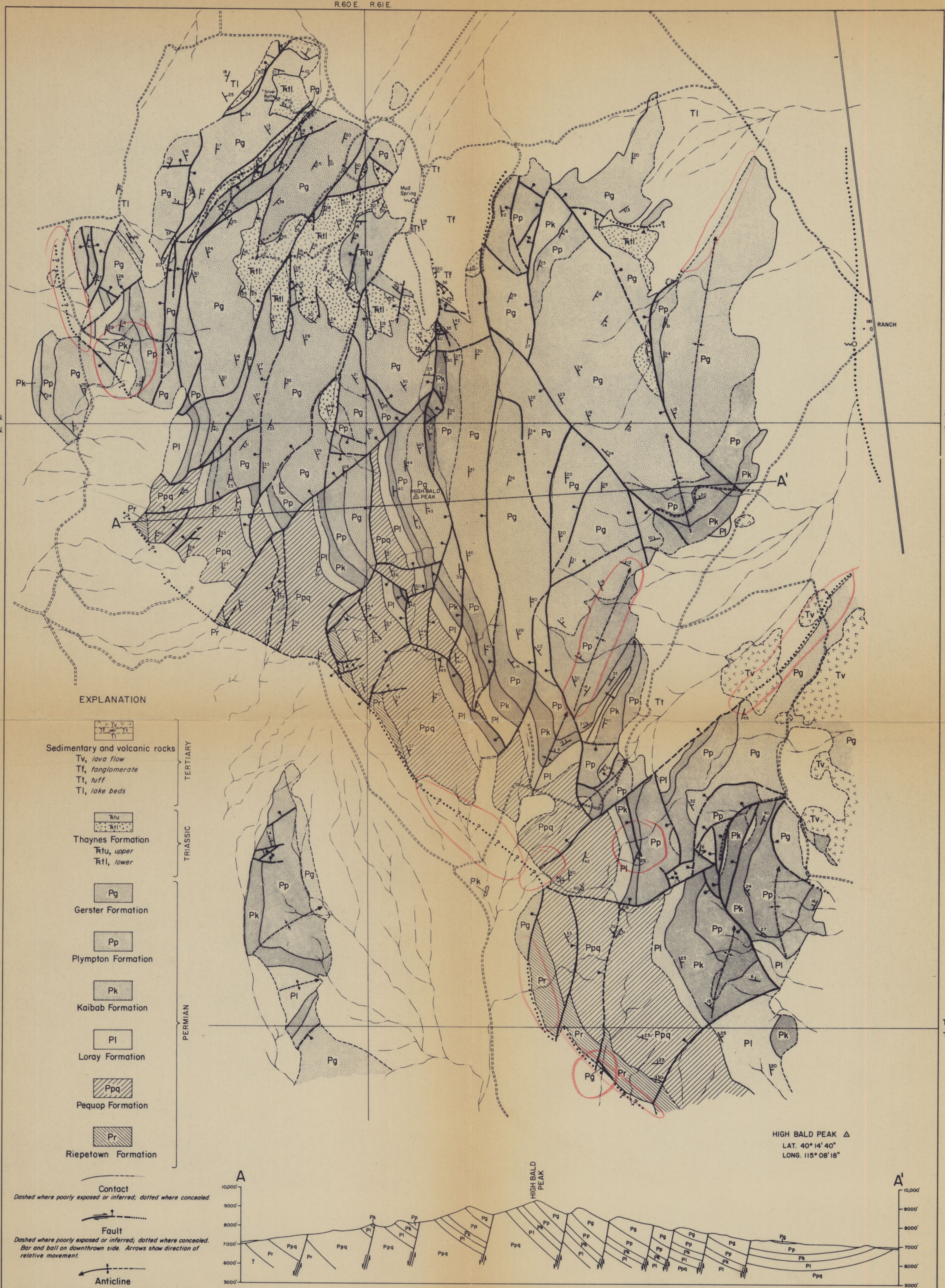
FAULT SHOWING DIRECTION OF MOVEMENT

0 — 1000' 2000' 4000' — 1 MILE — 2

SCALE

VERTICAL AND HORIZONTAL, 1:24 000

33000031



GEOLOGIC MAP AND CROSS SECTION OF THE MEDICINE RANGE, ELKO COUNTY, NEVADA

By

James W. Collinson

1968

33000031

EXPLANATION

Pliocene to Recent

- Qal — Younger Alluvium
- Qol — Older Alluvium (Lake Sediment, Terrace Deposits, Ash Fall Tuffs, etc.)
- Tb — Flow Basalt

Pre-Pliocene

- Tpai — Porphyritic Andesite Intrusives
- Tfi — Felsite, Rhyolite Porphyry Intrusives
- Tfv — Felsic Volcanic Rock Relationship Uncertain
- Tvu — Undifferentiated Volcanics

Cretaceous ?

- qm — Quartz Monzonite & Granite Cretaceous - Jurassic ?
- apl — Aplite

Jurassic

- Jms — Metasediments (Metasiltstone, Arkosic Arenite)
- Jmv — Metavolcanics (Tuffaceous Conglomerate Andesitic to Latitic Tuff)

Triassic

- Trls — Limestone
- sk — Skarn - Banded Hornfels interbedded Marble
- ma — Marble - Recrystallized Limestone
- Trph — Metasediments (Phyllite, Andalusite Schist)

Jasperoid

Quartz Vein

Intense Quartz Veining Greisen

Contact

High Angle fault

Thrust Fault

20 Strike & Dip

70 Joint

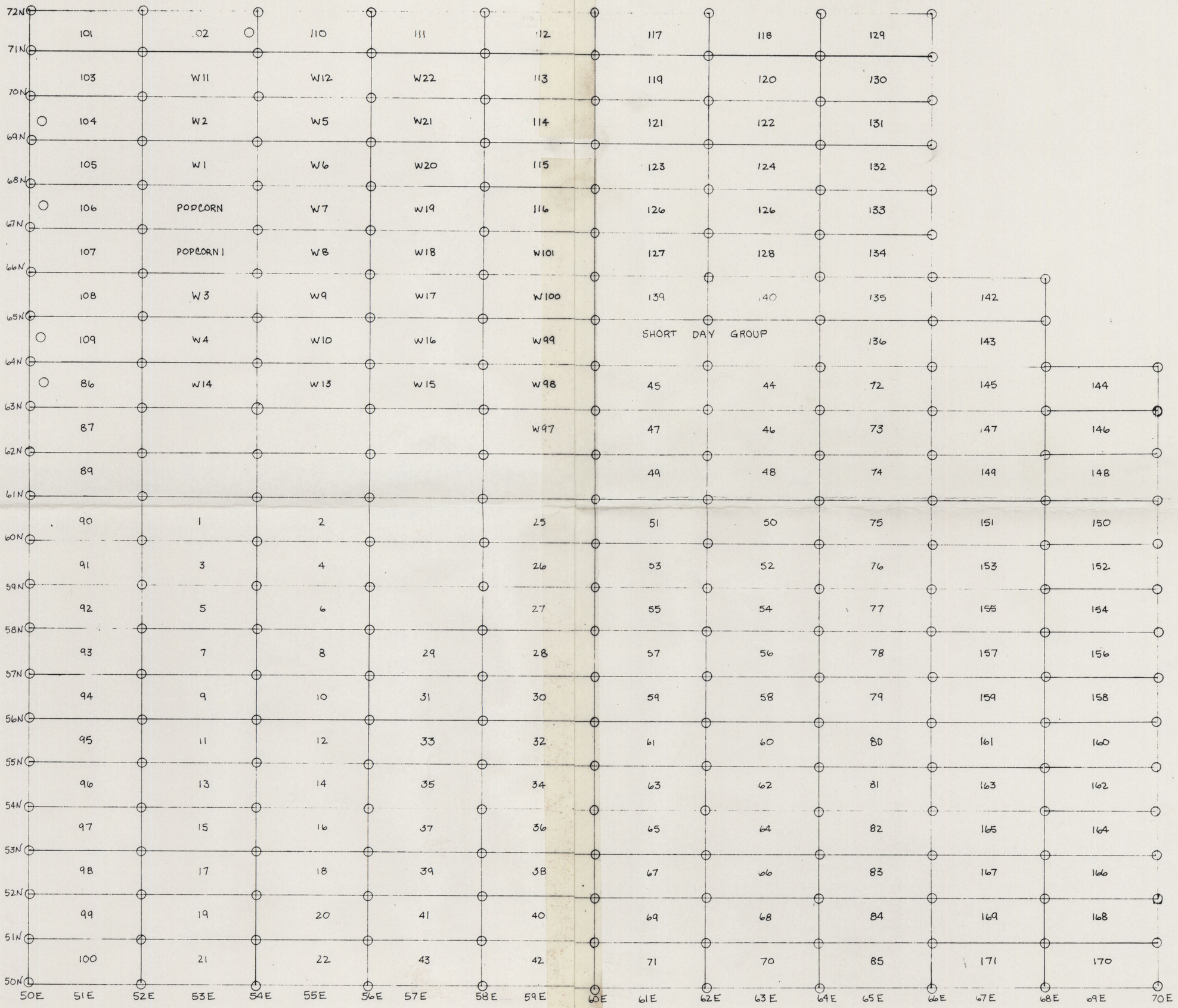
Syncline

1000 500 0 500 1000 2000 3000

33000031

STILLWATER MOLYBDENUM PROJECT

CHURCHILL CO., NEV.



WRANGELL PROJECT
NV QUAD. 247 NE

SAMPLE LOCATION
GRID MAP

3300 0031

Buckbrush Spring
Elevenmile
Black Knob
Black Knob Spring
Water Tank
SOUTH BLACK KNOB SKARN
ELEVENMILE ADIT
Platta
Tvu
Tfv
Tpai
Tpai (dike)
Tfi
Trls
Trph
Qal
Qol
Tb
Tvt
ma
qm
sk
3 3000031

Buckbrush Spring
Tfv
Tvu
Tpai (dike)
Elevenmile
ma
Tpai
Tfv
Tfi
Trls
qm
Black Knob
Black Knob Spring
Trph
Water Tank
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Tvu
sk
SOUTH BLACK KNOB SKARN
ELEVENMILE ADIT
Tb
Tvt
Qol
Plata
Jurassic
Triassic
Cretaceous ?

3300031

Buckbrush Spring
Tfv
Tvu
Tpai (dike)
Elevenmile
ma
Tpai
Tfi
Trls
Black Knob
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qm
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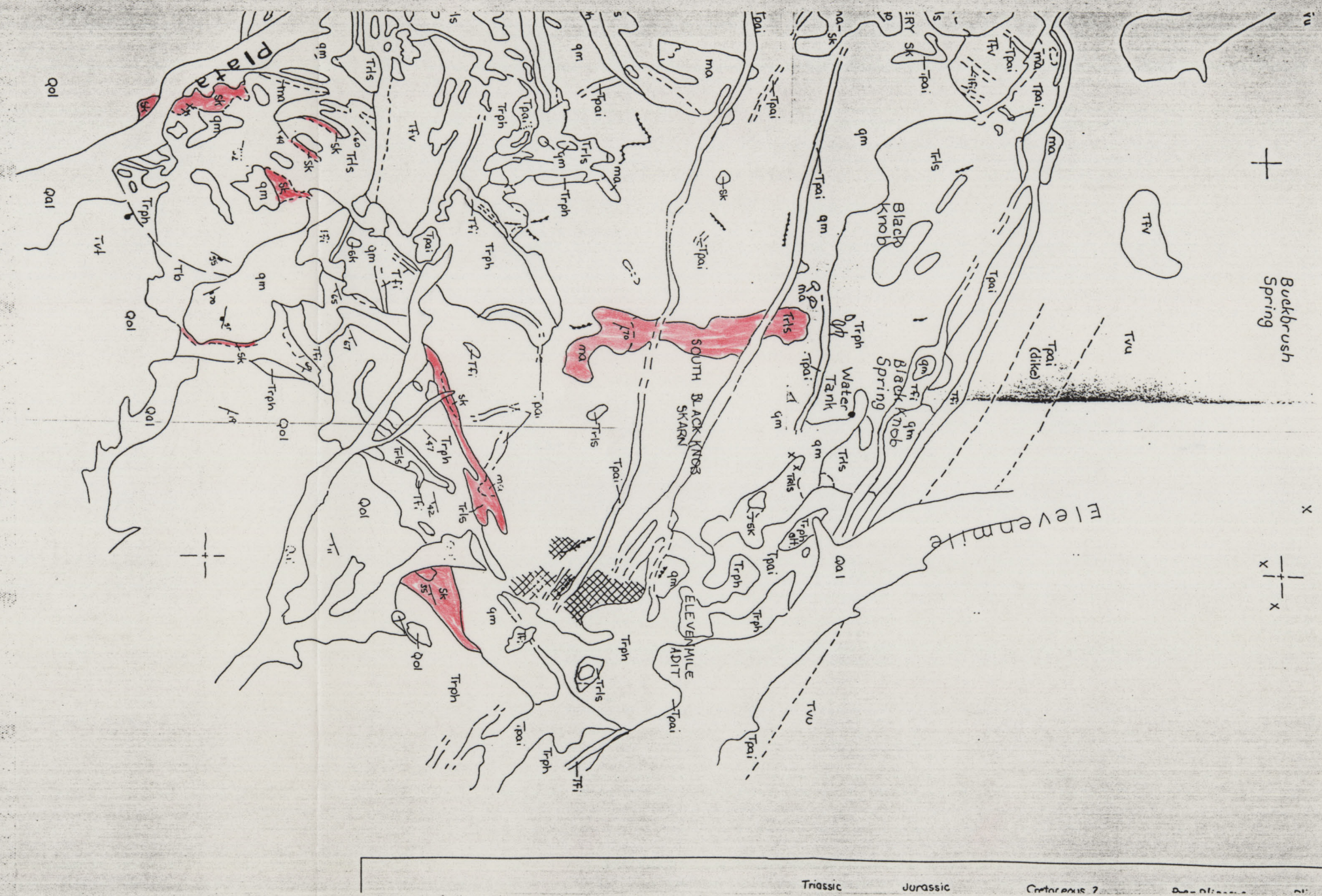
33000031


Buckbrush Spring
Black Knob
Black Knob Spring
Water Tank
SOUTH BLACK KNOB SKARN
ELEVEN MILE ADIT
Elevenmile
Tpai (dike)
Triassic
Jurassic

330003

MEDICINE RANGE, ELKO CO, NEVADA

PLATE I, GEOLOGIC MAP

J. W. COLLINSON, 1966

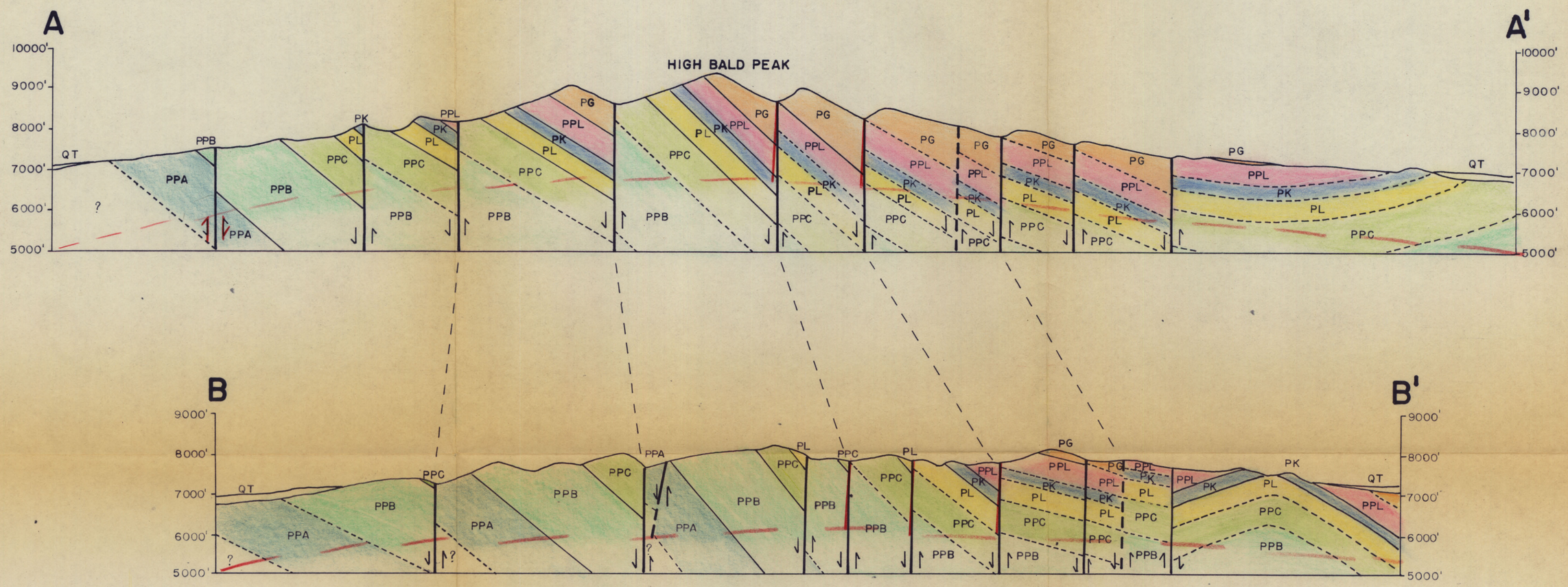
(PRELIMINARY MAP)

33000031 b.

PLATE 2, GEOLOGIC CROSS SECTIONS

MEDICINE RANGE, ELKO COUNTY, NEVADA

J.W. COLLINSON 1966
(PRELIMINARY)



STRATIGRAPHIC UNITS

QUATERNARY-TERTIARY	QT	UNDIFFERENTIATED
PERMIAN	PG	GERSTER FORMATION
	PPL	PLYMPTON FORMATION
	PK	KAIBAB FORMATION
	PL	LORAY FORMATION
	PPC	PEQUOP FORMATION, MEMBER C
	PPB	PEQUOP MEMBER B
	PPA	PEQUOP MEMBER A

GEOLOGIC SYMBOLS

CONTACT

ACCURATE — APPROXIMATE

FAULT SHOWING DIRECTION OF MOVEMENT

ACCURATE — APPROXIMATE

0 1000' 2000' 4000' 1 MILE 2

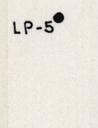
SCALE

VERTICAL AND HORIZONTAL, 1:24 000

33000031 c.

EXPLANATION

● DRILL HOLE



LA PLATA MOLYBDENUM

DRILL HOLE LOCATION

1" = 1000'

3300 0031 f.